

Scanning -- Shortwave -- Satellites -- Ham Radio -- Computers



Monitoring Times

Volume 21, No. 7
July 2002

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Hallowed Ground
Scanning National Battlefields

Shortwave's
Summertime
Secrets



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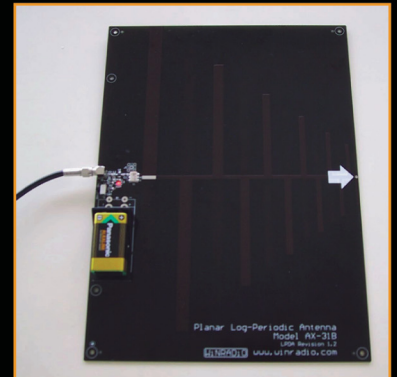
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- *"Exhibiting decent gain, acceptable noise figure, and high overload immunity, it works well in the upper VHF/UHF land mobile frequencies, and its low profile invites unobstrusive placement next to a wall or window."* MT, April 2001
- *"The result was stunning: I got better picture than with the TV antenna cable connected to the CATV socket in my apartment... this unit doubles up as the finest indoor TV antenna I have ever seen!"* Radiomag and R&C, Sep 2001
- *"Its construction...is high quality throughout."* PopComm, July 2002

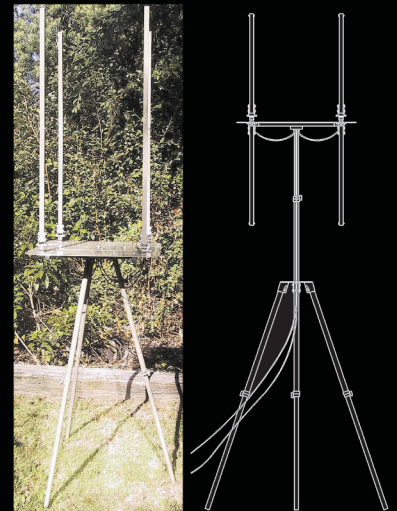


AX-31B antenna (battery not included)

NEW! AX-55D Direction Finding Antenna System

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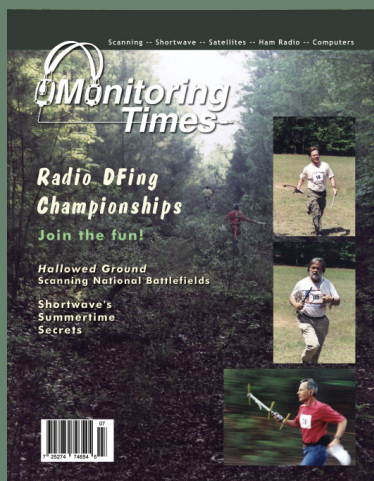
www.winradio.com

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Monitoring Times

Vol. 21, No. 7

July 2002



Cover Story

Radio Direction Finding Championships

By Joe Moell

Games and sports are a way of having fun while perfecting useful skills, and so it is with the sport of radio direction finding. Add the element of competition, and you have the Amateur Radio Direction Finding championships, which are contested on national and international levels.

Joe Moell recently attended a US championship meet in northern Georgia. Here is a lively introduction to the sport and some tips on getting started, beginning on page 18.

A sidebar by Robert Gonsett on page 21 is a case study of RDFing skills in a practical application.

On our cover: Two competitors get an early morning start chasing "foxes." Insets (top to bottom): Crossing the finish line are Kevin Haywood N4MGB, Marvin Johnston KE6HTS, and Charlie Siler KO4NO. Photos by Joe Moell KO0V.

Hallowed Ground 10

By Gayle Van Horn

Genealogy, which has a huge following in this country, leads naturally to an interest in history. Recently, *MT* staff writer Gayle Van Horn did what many Americans do while on vacation: she toured historic landmarks. Being a modern descendant on the Confederate side, Gayle combined her interest in genealogy, history, and the radio hobby to produce this unique look at Civil War battlegrounds.

If these national parks are on your itinerary this summer, be sure to bring your scanner along. Not all the action is in the past!

Shortwave's Summertime Secrets 14

By Dave White

If you think summer is only for doing antenna work and catching up on that stack of *Monitoring Times* back issues, we have some good news for you. There are plenty of shortwave listening opportunities in the warm weather months, including some that are best suited for the lazy, hazy days of summer.

The sidebar story, *A Summer Vacation on the SS Shortwave* (page 16), is chock full of recommended targets for summer listening to foreign shores.

Catching Baseball on the AM Band 22

By Ken Reitz

Americans have been listening to baseball on the radio for over 80 years. With these tips, you can, too. As the season progresses and we get into the playoffs, you'll be able to watch the games on TV, but turn down the sound and listen to the audio as it was meant to be heard: directly from the radio booth in the press box.

Who's Listening? Elena Machado...p.28





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Telephone: (828) 837-9200
Fax: (828) 837-2216 (24 hours)
Internet Address: www.grove-ent.com or
e-mail: mt@grove-ent.com
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Owners

Bob and Judy Grove
judy@grove-ent.com

Publisher

Bob Grove, W8JHD
bgrove@grove-ent.com

Managing Editor

Rachel Baughn, KE4OPD
mteditor@grove-ent.com

Assistant Editor

Larry Van Horn, N5FPW

Art Director

Bill Grove

Advertising Svcs.

Beth Leinbach
(828) 389-4007
beth@grove-ent.com

Reviews:

The new **TenTec RX-350** receiver com-
bines the best of both worlds: a proven ba-
sic receiver coupled with digital signal pro-
cessing and the option of full computer con-
trol. Although the RX-350 offers an impres-
sive array of cutting-edge features, Bob
Grove reports it's still intuitive to operate
(p.84).

Jock Elliott was needlessly worried
about the sophistication of the **Magellan
MAP 330 GPS** receiver in actual use: it was
a snap! And the **MapSend Topo** software
makes taking to the woods less daunting
(p.86).

Up until now, control programs for the
Yaesu VR-500 were limited to Microsoft
Windows users. Now Bob Parnass has writ-
ten **Tk500** – software compatible with Mac
and Linux systems as well (p.80).

The AirNav Version 4 suite of programs
are a real bonanza for aviation hobbyists
and professionals. This month John
Catalano looks at one program, **AirNav
Internet Lite**, where you can monitor the
progress of aircraft worldwide without even
using a radio! (p.82)

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Congressman Slams Broadcasters on Conversion to Digital TV

The transition to digital high definition television is not going well. At the urging of the National Association of Broadcasters, six years ago Congress mandated that all of the nation's 1200-plus TV stations were to begin digital television broadcasting by May 1, 2002. They called the switch to high-definition television (HDTV) the most important consumer-electronic advance since TVs moved to color a half a century ago. (CBS debuted the first commercial color telecast on June 25, 1951.)

Since the traditional (NTSC) format is so different, Congress gave each television station another new 6 MHz channel further up the video spectrum on which to broadcast digital. The plan was that, in 2006, each would return their analog channel to the FCC for auctioning, leaving the nation with only high quality digital six-channel surround-sound audio and high definition video. The May 1st date was not a "target," it was a "cast-in-stone deadline" that Congress and the broadcast industry together had agreed upon.

Well, as I write this, it is early May and most television stations still only broadcast their old analog signal. And the finger-pointing has begun. Everyone involved is blaming someone else – especially the American public – as to why it did not happen. The "industry" is essentially made up of three segments ...the broadcasters (which includes cable and satellite TV), the content providers, and the equipment makers.

Our economy is based on supply-and-demand. Without "demand" nothing happens. The average American spends his evening watching TV and many in the industry now say that consumers are content with "plain TV." The fact of the matter is that "industry" has done little to promote the transition among the nation's 100 million TV households.

Each faction instead is waiting for the other to get it going. But there can be no doubt as to which is to blame. It was the NAB and the broadcaster who wanted digital television and agreed to get it going ...to provide the platform on which the transition would ride. With no platform, few content providers have been motivated to push ahead

with HDTV programming. And with little programming, more than ninety percent of all new televisions sold are still standard color sets.

Most major TV markets do have some digital stations broadcasting in HDTV and where they are, high-end DTV sets are selling. An HDTV set has ten times more pixels (picture elements) than

a standard TV, resulting in movie theater resolution. But they cost more than twice as much as regular models. Digital set sellers universally agree that the lack of programming seriously inhibits their sales.

The government was supposed to reap billions for the U.S. treasury when the returned analog TV spectrum was sold. That won't happen as planned and regulators are furious with TV broadcasters. FCC Michael Powell has been encouraging program sources to mount a voluntary effort to ignite the HDTV revolution. But the main culprit still remains the limited number of digital TV

stations and television sets that can accommodate the signals.

"Broadcasters have broken their promise."

On May 1st, the deadline date for DTV transition, Senator John McCain (R-AZ), Ranking Republican of the Committee on Commerce, Science, and Transportation, gave a stinging reprimand to the nation's telecasters from the floor of the U.S. Senate.

He said May 1st is significant in U.S. technological history. He mentioned many accomplishments on that day including "On May 1, 1844, Samuel Morse sent the first telegraphic message. May 1, 2002, was supposed to be a wonderful day that represented another technological milestone for American television viewers.

"Unfortunately for consumers, a vast majority of broadcasters have missed the deadline, leaving consumers' digital TV tuners with little more than static. According to recent figures from the FCC and the National Association of Broadcasters, over 1,011 or 77% of commercial broadcasters have failed to meet the May 1 deadline."

He said, "The broadcasters have not only missed the deadline, but they have broken their promise to Congress and American consumers. In testimony before the Commerce Committee in 1997, the NAB stated, 'We agreed to an aggressive rollout for this new technology . . . Broadcasters have made a compact with Congress concerning high definition television. We will meet our commitments.'

"...it is clear that three quarters of those broadcasters have not met their commitments, and their failure to do so is slowing the transition to digital television. A slow transition affects Americans not only as consumers, but also as taxpayers. Broadcasters were given \$70 billion in spectrum to facilitate the transition on the condition that they return it when the transition is complete. By failing to meet today's deadline, broadcasters continue to squat on the taxpayers' valuable resource.

"I believe that broadcasters, as beneficiaries of this Great American Spectrum Rip-off, bear heightened responsibility for facilitating the DTV transition. I recognize, however, that even if the broadcasters were to meet their commitments, the transition would not necessarily be complete. ... I do not underestimate the amount of work that needs to be done. Michael Powell, Chairman of the FCC, has also recognized this. In what I believe is a step in the right direction, Chairman Powell has advanced a proposal that incorporates provisions for all of the industries involved with the DTV transition and asks for voluntary cooperation to accelerate the transition.

"Chairman Powell has called for the top four networks to provide DTV programming during at least 50% of their prime-time schedule beginning in the 2002-2003 season, and asked DTV affiliates of the top four networks in major markets to obtain and install the equipment necessary to broadcast a digital signal and inform viewers that digital content is being broadcast. The proposal also calls on cable operators with 750 MHz systems or higher to offer to carry, at no cost, the signals of up to five broadcast or other digital programming services. Additionally, the proposal asks the Direct Broadcast Satellite industry to carry the signals of up to five digital programming services that are providing DTV programming during at least 50% of their prime-time schedule.

"Finally, the proposal calls on the equipment manufacturers to include over-the-air DTV tuners in new broadcast television receivers between 2004 and 2006. I understand that certain industry representatives, including certain broadcast networks and the cable industry have ex-

pressed a general willingness to answer Chairman Powell's call. I think this is also a step in the right direction. I am hopeful that these commitments will lead to results.

"Make no mistake, I continue to be a firm believer in market forces, which is why I believe that this voluntary proposal is an appropriate step at this time. We must be mindful, however, that valuable public resources are at stake here. Should the transition continue to be delayed, alternative measures will need to be taken in order to reclaim the spectrum for which so many other productive uses can be found and which rightfully belongs to the American taxpayers.

"I believe therefore, that Congress needs to be prepared to intervene, if necessary, to protect the taxpayers of this country. If significant progress isn't made in the DTV transition, then I will introduce legislation that will not be voluntary. Codifying Chairman Powell's voluntary proposal may be the mildest measure we should consider. ... If progress continues to stall, then perhaps a more aggressive approach such as reclaiming the spectrum from the broadcasters beginning January 1, 2007, will be required."

New consumer advocates

A new California-based advocacy group called "DigitalConsumer.org" was formed by Excite founder, Joe Kraus. He wants Congress to pass a "Consumer Technology Bill of Rights." He fears that without consumer involvement, new laws will reduce consumer options when watching TV and listening to music. They believe there is a difference between copying and piracy and that con-

sumers should have the right to:

- Time-shift media... record a TV show and watch it later.
- Space-shift media ...copy a CD you have bought to an MP3 player
- Make backup copies, in the event the original is destroyed.
- Use legally acquired media on the platform of your choice. For example, watch TV on your PC or listen to music on your MP3 player.

American Association of Radio Enthusiasts

During the informal annual industry meeting of amateur radio manufacturers held in Milwaukee, Wisconsin ... the industry decided to create a formalized and official industry group for dealers and manufacturers.

The American Association of Radio Enthusiasts (AARE) was formed as a non-profit corporation for the promotion of amateur radio and emergency communications into areas outside of amateur radio. The organization will provide a conduit for dealers and manufacturers to exchange ideas, to work together on projects, to help ham radio to grow and double the number of hams in 5 years.

Members of this group will be the manufacturers and dealers of radio and emergency products. An executive team was chosen to lead the debut year. The initial officers of the group are: Ray Novak, KC7JPA, of Icom America; Rick Ruhl, W4PC, of Creative Services Software; Evelyn Garrison, WS7A, representing Alinco; Gordon West, WB6NOA, of Gordon West Radio School; Bob Heil, K9EID, of Heil Sound; and Randy Gawtry, K0CBH, of Timewave Technology.

The AARE website is located at <http://www.aaregroup.org>. The group will be "the voice" of the manufacturers and dealers in radio, much like the American Radio Relay League is the voice for each ham radio operator.

FCC enforcement

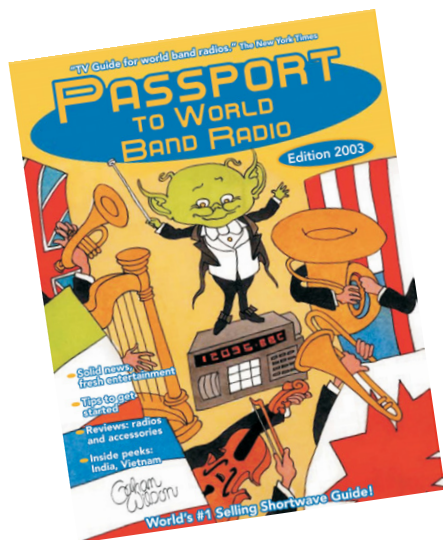
Five power companies have been warned about RFI (radio frequency interference) to amateur radio operations. Socorro Electric Cooperative (Socorro, NM), Dominion Virginia Power (Richmond, VA), City of Anderson, IN; Southern California Edison (Rosemead, CA); and Northeast Utilities (Berlin, CT) have all been notified by the FCC that it has received complaints that equipment operated by their electric utility companies may be causing harmful radio interference to operators in the Amateur Radio Service.

Under FCC rules, most power-line and related equipment is classified as an "incidental radiator." This term describes equipment that does not intentionally generate any RF energy, but may create such energy and an incidental part of its intended operation.

The FCC said that amateur radio operators have not been successful in working through their utility company's complaint resolution process. All five companies were told that they "...should locate the source of any interference caused by their equipment and make necessary corrections within a reasonable time. Unresolved problems may be a violation of FCC rules and could result in a monetary forfeiture for each occurrence."

Pre-Publication Sale!

2003 EDITION PASSPORT TO WORLD BAND RADIO



The world's best selling shortwave guide is now bigger and better! Edited by Lawrence Magne, Passport is the ultimate shortwave hobbyist's listening reference. At a glance, Passport's exhaustive chart shows world broadcasters by frequency and time, indicating station power and language as well.

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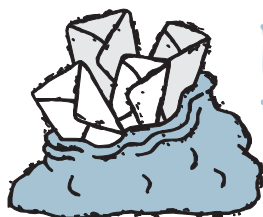
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LETTERS TO THE EDITOR

Thanks for the Programming

"Based on the favorable review of the Yaesu VR-120 portable scanner by Bob Parnass in the July 2001 *MT*, I decided to buy one of these tiny radios in August 2001. At the time I purchased the VR-120 there were two prospects for PC programming software for this radio. Unfortunately, one company stopped development on the VR-120 software project before completion, and the other company apparently never started.

"Thankfully, Bob Parnass came to the rescue by developing the open-source radio programming software tk120, which can be found on the web at the following site: <http://members.core.com/41/2D/parnass/tk120/>

"A small scanner with no numeric keypad almost requires programming software, and with tk120, programming the Yaesu VR-120 is almost effortless. Now I can finally use my VR-120 to its full potential. Thanks so much to Bob Parnass for making this possible."

— Gary Kinsman, Simi Valley, CA

On Bob Parnass' website, mentioned above, you will also find similar software he developed for the Icom IC-R75, Icom IC-R8500, NRD 545, and Yaesu VR-500 receivers.

Dead-end Reference

In the May issue, a cryptic note in Glenn Hauser's *Global Forum* said "IRELAND See SW Guide," but, as John Rosenberg pointed out, nothing appeared on those pages about Ireland. Here is the RTE schedule which was omitted due to lack of space:

IRELAND: RTE Radio One

[non] A-02 schedule in English via Merlin:

6155 0130-0200 RMP 500 kW / 275 deg to CAm

15280 1000-1030 SNG 250 kW / 135 deg to Au/NZ

15585 1800-1830 RMP 500 kW / 105 deg to ME << ex 15315

13640 1830-1900 SAC 250 kW / 277 deg to NAm

21630 1830-1900 ASC 250 kW / 070 deg to Af

(Observer, Bulgaria)

Don't Call them Hams

"Thanks for the many wonderful issues of *Monitoring Times*.

"I have to complain about the titling of the May article about pirate two-way operators in Europe. While the article itself was interesting and informative, the term 'pirate ham' is an oxymoron. It is a bit insulting to the many good, considerate operators, and may be misleading to those new to the monitoring hobby.

"I am proud of being called a ham, and proud of being a member of the amateur radio service. I am ashamed to be grouped by *MT* with these pirates that potentially risk human life by interfering with licensed, legitimate services."

— 73 de Drew N0XU (Andrew Wilson)

You make a valid point, Drew. I will agree

that the headline was a misnomer, in that an unknown percentage of those who participate in illegal two-way operations have no license of "any" kind. The article makes it clear these operators are quite a mix of hams, ham wannabes, ham drop-outs, CB operators, etc.

On the other hand, I don't believe it reflects on amateur radio operators as a whole to say that some of them are guilty of operating illegally — while yet remaining hams. I trust that even those new to the hobby will understand that such operations are not condoned by the Amateur Radio Service or by *MT*.

Changes in French Radio Landscape

Michel Berlie-Sarrazin wrote to provide some changes to his April feature on the *Radio Landscape of France*, especially modifications to the marine band.

The French fishing fleet

Schedule (local time)	Emitting Frequencies	Receiving Frequencies	Watching Frequencies
09H00 to 09H20 (open sea)	4411 kHz	4119 kHz	2096 kHz
Auction of fish to fishmongers (see below)	1671 kHz	2096 kHz	4119 kHz
09H30 to 09H40	Yeu	10H05 to 10H2	Penmar'ch
09H40 to 09H55	Concarneau	10H20 to 10H40	Loctudy - Lesconi
09H55 to 10H05	Douarnenez- Audierne	10H40 to 11H00	Le Guilvinec

* Backup: 3722 kHz (emitting frequency) and 3317 kHz (receiving frequency).

* Watch: Monday to Friday up to 12H00, and from 15H00 to 16H00.

* Calling list: on Saturday, Sunday and holidays, from 09H00 to 11H00.

Berne Radio (Switzerland)

Duty schedule is 06H00 to 22H00 local time now. During summer time: an hour earlier. All frequencies unchanged.

Monaco radio (Monaco Principality)

Meteorological bulletins or warning: 4363 kHz frequency canceled, other frequencies unchanged. Schedule unchanged.

CROSS meteorological bulletins

Soulac service is canceled. Others are unchanged.

Madrid Radio

Emitting frequencies:

13176 kHz changed for 13177 kHz.

22696 kHz changed for 19755 kHz.

Receiving frequencies: 22000 kHz changed for 18780 kHz.

"All this maritime information are excerpted from the *Almanach du Marin Breton* (Brittany Sailor Almanac), 24 quai de la Douane, boîte postale 07, 29266 Brest cedex, France, e-mail: marin-breton@wanadoo.fr, with their permission."

Yoink-Yoink-Yoink

"I read with interest the answer to Mark Burns in the May 'Ask Bob' column about the noise being heard in the 4.8 MHz area of the band. [Rather than ALE or Link 11 transmissions], what he is probably hearing is the Swoosher noise caused by CODAR systems used by various universities on the East Coast and in other areas of North America.

"The best explanation of these noises and the systems producing them can be found on page 37 of the March 2002 issue of *Listening In* published by the Ontario DX Association. You can also find more information at <http://www.rovers.net/~hackmohr/swiper.htm>

— Jacques d'Avignon



CODAR site at Brigantine, NJ, courtesy Rutgers University

Las Vegas without a Radio

Thought I might pass this info along about the Las Vegas Metropolitan Police Department: via their website, they have a scanner function where you can listen to live audio from their radio system. They also have a listing of their codes and other interesting items for radio monitors. The link:

http://www.lvmpd.com/video_audio/scanner.htm

Thanks for the great magazine.

— Bill Rogers

Radio Is an Education

"I am inspired to write about several articles in the June issue. First, the two items on radios in the classroom. Radio is a fantastic medium for teaching all sorts of subjects (electrical engineering, geography, meteorology, not to mention public speaking, languages, political science, etc.) and I'm glad to see people tapping in to its potential.

MT readers should know that they do not need a classroom to get young people interested in radio. I recently gave a small inexpensive AM/FM radio to the seven-year-old son of some good friends, and he loved it. He was amazed at the different stations, all sorts of music, and especially at finding his beloved New York Knicks basketball team on the dial. Have I started him on the lifelong adventure that radio has been for

me? Only time will tell. I hope so, and I plan to get my own son started as soon as he is old enough to understand.

I do not know what to think about Bob Zanotti's contention that 'management has no patience with QSL-card hunters.' I didn't know it was regarded as such a problem. I pay plenty of attention to programs – in fact, that's why I listen to SW. QSLing is just a bonus – a souvenir, a kind of atmospheric postcard connecting me with places I may never visit but am interested in just the same. If Swiss Radio International and other stations have such a hard time about QSLers, why not simply adopt the BBC's policy of no QSLs, then call a good recycling company to haul away all the letters you receive from 'things of the past' – people like me.

Finally, I really appreciated John Figliozzi's comments about how radio hobbyists 'seek to learn about and cooperate with nature to gain what they seek...(and) recognize that life has its limitations and are more grounded and realistic in their assessments.' Hear, hear, my good man. John's comments remind me of how tired I am getting of our 'high-speed-access' world – who needs e-mail in the car, anyway?! There are just times when I want to be out of touch, out of contact and out of sight. That's when you'll find me curled up with my shortwave radio, tuning in programs from around the globe, learning about the world I live in. And that's an experience you can't download from any source.

Proud to be a subscriber,

– Matthew Stanley

Thanks, Matthew. We appreciate the comments. You and I may be an anachronism, but as long as there are folks like us around, we'll keep this great magazine going.

You also remind me that I forgot to mention in June that *MT* provides complimentary subscriptions during the school year to anyone using radio in the classroom or in an after-school program. Just send us a note on school letterhead regarding your program and its focus. Teachers (and listeners, too) should check <http://www.monitoringtimes.com/html/mteeducation.html> for a selection of online articles on ways to make use of shortwave radio. Thanks to Anton Ninno for updating these links (and for writing many of the articles).

Closing Comments

In this month's *Closing Comments*, Bob Grove acknowledges the future for HF transmissions may well be entirely digital. If you want to know what it sounds like, Alan Bosch sent us this email: "Hear the sound of the future – tests of digital shortwave broadcasting from Digital Radio Mondiale, a European-based consortium of SWBCers including Radio France, Deutsche Welle, and Radio Nederland."

By going to the main site <http://www.drmm.org>, you can hear decoded audio from actual on-air tests and get a schedule of current tests, when you can hear what it

sounds like without decoding! Alan says "Some transmissions sound like soft static, others like a machine gun."

Bob also made reference to this being editor Rachel Baughn's 20th anniversary with Grove Enterprises. Here's a picture of Rachel at her desk working on the July issue!



We welcome your ideas, opinions, corrections, and additions in this column. Please mail to **Letters to the Editor**, PO Box 98, Brasstown, NC 28902, or email mteditor@grove-ent.com. Letters may be edited for length and clarity. Happy monitoring!

– Rachel Baughn, KE4OPD, editor

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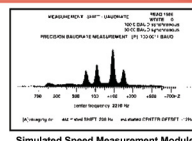
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Foxhunting, post-9/11

Radio direction finding is a sport practiced by many amateur radio clubs, but not all of them take place in remote areas like the ARDF championships described in this month's feature article. *MT* received a copy of a memo sent by the Boston Amateur Radio Club to amateur radio clubs and fire departments across Massachusetts regarding "fox hunts." Apparently, a club in Eastern Massachusetts situated their "fox" near a shopping mall. To passersby it looked just like a radio-controlled explosive device, and the authorities were called.

The memo says, "I strongly suggest that any club conducting fox hunts notify public safety officials that a fox hunt is taking place in their community and where the fox is located. It would be very easy for any public safety official to consider the fox to be a 'device' and treat it accordingly. ...The events of 9/11 have considerably heightened public awareness of anything that looks suspicious. Many times, the fox is hidden in strange locations and this further complicates the problem. A simple notification made to the local public safety officials may eliminate a major public safety response and prevent our noble hobby from receiving any bad publicity."

DC Fire Dept woes

The Wash DC Fire Department uses a digital 800 MHz radio system that was installed approximately two years ago, which operates in both repeater and simplex mode. However, the system has experienced numerous problems: The \$5.3 million emergency radio system cannot reliably reach firefighters in more than four dozen locations around the city, including police and FBI headquarters, Union Station, the MCI Center and the State Department. Recently two radios operating on a simplex channel couldn't hear each other from 40 feet apart.

Fire officials have said the problems stem from the fact that the city needed 19 antenna towers to relay radio signals but only four were built. The additional towers for the 800-megahertz Motorola system were eliminated to cut costs. Reportedly, part of \$45.5 million in federal September 11 funds earmarked for the Office of the Chief Technology Officer will be used to correct the communication system's problems.

The department received new attention in late April D.C. when firefighters lost precious seconds in battling a blaze at Sen. Evan Bayh's home because their hoses would not fill with water. The incident highlighted the crisis that has left the D.C. Fire and Emergency Medical Services Department with crumbling stations, aging vehicles, faulty radios, inadequate training, and flagging morale. Solutions are hindered by a fire department bureaucracy that must deal with two separate unions while answering to the mayor, the D.C. Council and Congress. Moreover, in the first 2-1/2 years of his administration, Mayor Anthony A. Williams has had four different fire chiefs.

If you'd like to check out DC's fire depart-

ment for yourself, click on Andrew Leyden's website at <http://www.penguinradio.com/non-traditional/scanners/> to hear DCFD dispatch monitored by scanner and put out to the net. Leyden advises listeners "It's running on my home DSL so feeds are limited, very limited." Also consult the Capitol Hill Monitors' web page at <http://henney.com/chm/> for updates.

Digital systems still vulnerable

"I just killed an officer," said the transmission from an Albuquerque police officer's radio on the evening of May 10. The dispatcher queried the person using the radio, "Where did you kill the officer?" Upon reply, nearly 30 officers, Bernalillo County Sheriff's deputies, and the APD helicopter converged on the area in the search for a possible fallen officer.

The Albuquerque Police Department converted from an analog communications system to an Ericsson digital 800-MHz trunked radio system about two years ago, so the transmission had to be coming from a police radio. However, a little research showed the man used a call sign which proved to be outdated and did not match the unique identifier that Ericsson radios transmit with each radio transmission. APD was able to figure out exactly what radio was being used for the phony transmissions and found the off-duty police officer out to supper with his wife.

A SWAT team went to the officer's home where he had left the radio. There they found Max Gallegos, a drywall worker who had been hired to do some work on the house. Police learned that Gallegos was on probation or parole for a drug-related charge and was wanted on misdemeanor charges. He is being charged with "interfering with police communications," a misdemeanor, and his probation was revoked.

The misdemeanor charge may not sound like much, but "We intend to sue him for the cost of this operation," said the agency.

Airline safety

The European Organisation for the Safety of Air Navigation (EUROCONTROL) has just finished tests to demonstrate that 3rd generation wideband communications could eventually enable airborne activity to be continuously monitored for security purposes. This technology could also help communications with air traffic management control and maritime industries.

In the tests, live video activities in the cockpit and cabin were relayed to a ground station, along with still photographs taken with a webcam. A passenger on the aircraft browsed the Internet and watched a video streamed from a server on the ground. For more information, visit <http://www.eurocontrol.int>

Ham tower bill

A bill introduced in Congress May 14 could provide relief to amateurs prevented by private deed covenants, conditions and restrictions (CC&Rs) from installing outdoor antennas. Rep Steve Israel (D-NY) has introduced the "Ama-

teur Radio Emergency Communications Consistency Act." Rep Greg Walden, WB7OCE (R-OR) – the only amateur radio operator in Congress – and Rep Pete Sessions (R-TX) have signed on as original cosponsors.

The measure contains just one sentence: "For purposes of the Federal Communications Commission's regulation relating to station antenna structures in the Amateur Radio Service (47 CFR 97.15), any private land use rules applicable to such structures shall be treated as a state or local regulation and shall be subject to the same requirements and limitations as a state or local regulation."

No satellite decoding

Canada's Supreme Court voted unanimously that businesses selling equipment to re-



July 1-Aug 31: Vacation BCL Contest

Open to DXers worldwide, log one broadcast station from each country in Africa (no pirates, clandestines, or hams), 1 point per country between 2300 kHz-26 MHz. For prizes, send your list before Sept 15 to Frank Parisot, PO Box 6, 92173 Vanves, Cedex, France, or email to frankparisot@hotmail.com. See <http://swlcontest.homestead.com> for details and rules.

July 6: Oak Creek, WI

South Milwaukee ARC 34th annual Swapfest, American Legion Post 434, 9327 S Shephard Ave; 6:30am-2pm CDT; talk-in 146.52 simplex and local repeaters, admission \$5. Free parking, picnic area, refreshments, "happy hour," cash prizes. For more info email ryatex@aol.com, phone 414-762-3235 or write South Milwaukee ARC, PO Box 102, South Milwaukee, WI 53172-0102.

July 14: Kimberton, PA

Mid-Atlantic ARC Valley Forge Hamfest and Computer Fair, July 14, Kimberton (PA) Fire Company Fairgrounds, Route 113, S of intersection with Route 23, rain or shine; 8a.m., admission \$6. Talk-in 146.835- and 443.800+ (PL 131.8) Door prizes, demonstrations, exams, food and beverage. E-mail Hamfest-info@marc-radio.org or write MARC, P.O. Box 2154, Southeastern PA 19399-2154. Information also on the club website <http://www.marc-radio.org>.

July 20: Seal Beach, CA

Southern California Area DXers (S.C.A.D.S.) meeting: Scanners – Frequency Guides and Local Emergency channels – <http://www.ocnow.com/community/groups/radiocommunications>.

July 27: Cincinnati, OH

OH-KY-IN ARS Hamfest, Diamond Oaks Career Development Campus, 6375 Harrison Ave (I-74 to exit #11; east on Harrison, 1 mi on right), talk-in 146.670(-) and 146.925(-); admission \$6. Seminars, transmitter hunts, indoor vendors, outdoor flea market, refreshments, VE exams (8a.m.; walk-ins accepted). <http://www.ohkyin.org>, email wd8jaw@arrl.net, or write Lynn Ernst WD8JAW, 10650 Aspen Place, Union, KY 41091-7665, 859-657-6161.

ceive satellite signals from outside Canada are violating the Radiocommunication Act, which outlaws the unauthorized decoding of an encrypted signal. However, the high court also left it up to the so-called gray-market satellite providers to make their case in court that the federal law violates freedom of communication guaranteed under the Charter of Rights and Freedoms by not answering Constitutional questions raised in the case.

Radiation alert

Scientists in Japan found that electromagnetic radiation levels inside trains can exceed international safety limits if even only a small number of passengers are using their mobile phones. This is because the microwave radiation emitted from handsets has effectively nowhere to go and simply bounces back off the carriage's metal structure.

Tsuyoshi Hondou, from Tohoku University, calculated the impact of mobile phone microwave radiation. He found that very little radiation managed to escape through windows but was instead reflected inside. Similar conditions may also occur with phone use inside elevators and buses, but no one has done the research.

Off the hook

Remember when *Communications* passed along a report that more than two dozen listening devices were found hidden in the new presidential airplane being refurbished in the United States for Chinese president Jiang Zemin? It was somewhat of an embarrassment for the US and the company doing the refitting, since suspicion fell on US intelligence agencies. Now, however, the Chinese president apparently believes the bugging was performed by the Chinese military on orders of Li Peng, head of China's legislature.

No flashing cellular antenna displays

The Federal Communications Commission recently issued a warning against a display used by some cellular antenna vendors, which ironically interferes with cellular reception. The antenna accessory, which includes a flashing light on the tip of the antenna, is harmless, but the vendor-operated display devices used to demonstrate them can cause interference to licensed radio services.

"Flashing Cellular Antenna Display units are used to show what the accessory looks like when it is activated. In the past year there has been an increase in the use of Flashing Cellular Antenna Displays. These display units send radio signals through several accessory antennas to make them flash. The radio signals from the Antenna Display units cause interference on cellular frequency bands. This interference is harmful to cellular communications and poses a threat to other services in nearby frequency bands.

"Devices that use radio frequency energy, such as these display units, require approval from the FCC prior to marketing or use. FCC

approved devices can be identified by a permanently attached label stating compliance with FCC Part 15 requirements. At this time there are no FCC approved Flashing Cellular Antenna Displays.

Vendors operating Flashing Cellular Antenna Displays are advised to turn off these devices immediately... The FCC is currently investigating over two dozen cases of interference caused by these unapproved devices."

RFID antennas

The Fractal Antenna Systems company hasn't been idle since *MT*'s cover story in April 1999. The company has focused on the small, efficient, and low-cost antennas required by the evolving radio frequency identification (RFID) industry. Antennas are key to RFID system performance, yet traditional antennas are much too large for convenient use in tags. The latest application in development by Fractal Antenna Systems is called Captenna(TM) – perfect for tagging very small objects and fast moving consumer goods like soft drinks.

Global standards for UHF RFID frequencies in the 900 MHz range span about 66 MHz. Captenna antennas offer tunable multiband or wideband coverage so that a single antenna design can be used by region-specific chips – no matter what the region.

FAS also markets the miniature dipole-equivalent tag antenna, the Tagtenna(TM) 900 and the compact circularly polarized reader antenna, the Readtenna(TM) 900.

"Communications" is compiled by editor Rachel Baughn from news clippings and email forwarded by our readers. Thanks to this month's MT reporters: Anonymous, Albany, NY; Doug Robertson, Oxnard, CA; Brian Rogers, Melvindale, MI. By email: Chanel Cordell, Jacques d'Avignon, Hans Johnson, Rick Kissel, Henry LaViers, Dale Lowdermilk, Robert Smathers, John Stanko, Laura Quarantiello, Al Stern, Larry Van Horn, Peter Vieth, Robert Wyman.

United Nations Radio

Radio UNAMSIL is the station of the United Nations Assistance Mission in Sierra Leone. This West African nation has been devastated by civil war over a number of years. The UN went into Sierra Leone in order to bring an end to the conflict.

Much of the UN's effort, therefore, is military, with roughly 15,000 peacekeepers from over a dozen countries deployed. However, part of the UN's endeavor is also disseminating information through Radio UNAMSIL. As station manager Sheila Patricka Davis explains, "Misinformation is more deadly than no information at all." Radio UNAMSIL's goals are to explain the peace process and the UN mandate to disarm the nation.

Radio UNAMSIL draws its inspiration from Radio Minurca, a peace station that once transmitted to the Central African Republic. They also have in common much of the same equipment, as many items from Radio Minurca were transferred to Radio UNAMSIL. The Danish government donated much of the equipment – all except the 1,000-watt shortwave transmitter, which was purchased.

Radio UNAMSIL started broadcasts on 103 MHz FM in September of 2000. Shortwave appears to have been a much more recent addition. It certainly did not start at the same time as the FM. Although it has been advertised for some time, this writer suspects that technical difficulties have frequently kept it off the air.

There have been a number of reception reports in recent weeks. Radio UNAMSIL is heard on 6173.8 kilohertz with the best reception around 0600 to 0700 universal time. Programming is in English and consists mostly of popular music. This format has made the station extremely popular in Sierra Leone, particularly among youth.

QSL hunters can reach the station at: Radio UNAMSIL c/o UN Assistance Mission in Sierra Leone Headquarters, Mammy Yoko, Post Office Box 5, Freetown, Sierra Leone. Their fax number is 232-22-273-189.

– Hans Johnson

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HALLOWED GROUND

By Gayle Van Horn
photos by Gayle and Larry Van Horn

We are the people to whom the past is forever speaking ...

Besides being an avid radio enthusiast, I also enjoy studying history and in particular my family history. I enjoy listening to the stories of the past because history speaks to me with many voices, something akin to listening to the many voices of shortwave broadcasters from around the world. But it is the history of the Civil War that speaks to me the loudest.

I recently had the opportunity to retrace the steps of one of my ancestors who fought during the Civil War by traveling to several battlefields on which he fought while serving with the Confederate Army of Northern Virginia. My trip to these battlefields took me to the states of Virginia, West Virginia, Maryland and Pennsylvania. And what happened on those fields 140 years ago still defines us today. For me, personally, these battlefields truly represented "hallowed ground."

This trip gave me the opportunity to monitor on my Radio Shack Pro-43 scanner quite a few National Park Service communication systems and some other interesting local services in each area I visited. I found that being able to scan these various agencies really enhanced my visit to the various battlefields and it allowed me to stay on top of what was going on.

Travel Monitoring Tips

All the battlefields I visited during the trip are run by the National Park Service (NPS), which is a part of the government's Department of the Interior. You will find their main communications being conducted in the federal land

mobile frequency bands (162-174, 406-420 MHz). Unlike other federal agencies, all of the NPS communications I monitored during the trip were in the clear (no encryption).

You will hear a surprising variety of communications on NPS frequencies. All departments serving a particular park share the same system. So, you will hear everything from park maintenance calls to rangers handling law enforcement actions.

You should also keep 155.475 MHz, the national law enforcement common, in a memory channel, as it is frequently used by federal law enforcement agencies. I also found that programming in statewide mutual aid channels is a great way to get current road conditions and other important information while traveling. Table one is a listing of State Highway Patrol and mutual aid frequencies monitored during the trip.

I also found keeping the 14 Family Radio System frequencies in the scanner was both use-

ful and entertaining. Table two has a complete list of those frequencies.

Our first stop will be in Virginia – Manassas, to be exact – site of the Civil War's first major engagement.

Manassas National Battlefield Park, Virginia

To many, the firing on Ft. Sumter on April 12, 1861, signaled the separation of the United States into two nations. Shortly after Sumter, the North and the South began to prepare for war – training troops and enlisting armies.

On July 21, 1861, events near the small Virginia community of Manassas Junction shocked the nation. The first major confrontation of the opposing armies took place here, and the nation realized that this war would be longer and more costly than anyone imagined.

The first battle of Manassas, or Bull Run as it was called in the North, claimed 5,000 casualties. Not only were the dead and wounded members of the opposing armies, but of the civilian population as well. Ultimately, the romanticism and adventure of war was lost as the nation realized it had gone to war with itself.

In August 1862, the armies would clash for a second time at Manassas. The troops, now seasoned veterans, had lost their wide-eyed innocence and had seen the realities of war. The Second Battle of Manassas, covering three days, produced far greater carnage and brought the Confederacy to the height of its power.

As you tour the park, you can monitor law enforcement and



Shrine to "Stonewall" Jackson

maintenance activity on 163.125 (simplex). Also look for activity on the park repeater system 171.650/172.725 MHz. Manassas also has a Travelers Information Service broadcast (WNHQ463) on 530 kHz.

Manassas area public safety agencies have recently installed a five channel Motorola ASTRO APCO-25 compliant digital system in the 800 MHz band. You will have to wait on the new Uniden digital scanner, due out at the end of this year, to monitor this system. The frequencies being used by this system are: 866.0875 866.1125 867.875 868.400 868.425 MHz

Richmond National Battlefield, Virginia

Located on the James River, Richmond, Virginia, was a symbol and prime target throughout the Civil War. Leaders on both sides reasoned that if Richmond, capital of the Confederacy, was captured, southerners might lose their will to resist. Between 1861 and 1865, Union armies repeatedly attempted to capture the city and end the Civil War. Three of those campaigns came within a few miles of the city.

The park includes 11 different sites associated with those campaigns, including battlefields at Malvern Hill, Cold Harbor and Gaines' Mill. A complete tour of the park involves an 80 mile drive. I'd recommend you begin your visit at the Richmond Visitor Center on Tredegar Street. Smaller visitor centers are located at Cold Harbor and Chimborazo. Spend some time walking in each area of interest for a better understanding of the battlefields.

The communications system serving the Richmond area can be heard on the following frequencies:

Frequencies:

Park Rangers direct 166.950 (179.9 Hz PL tone)
Park Rangers repeater 166.950/166.325 (179.9 Hz PL tone)

Callsigns:

KID740 Chambers Peak (Chimborazo Park Headquarters)
KID712 Fort Harrison (Maintenance Area)
KID779 Cold Harbor (Watt House)

Like Manassas, the Richmond city public safety agencies are also using a Motorola ASTRO digital trunked system. The police and fire departments are currently sharing the same trunk system.

Richmond Police/Fire

Frequencies:

866.1375 866.2375 866.3875 866.5125 866.6625
866.7875 866.9125 867.0125 867.0875 867.1875
867.3375 867.5125 867.6125 867.7250 867.8625
867.9625 868.0125 868.1250 868.2375 868.4125
868.5125 868.7000 868.8250 868.9500

Henrico is the county that surrounds Richmond and where most of the battlefields are located. A Motorola APCO-25 compliant 800 MHz trunk system is in service for the entire county, including both public safety and public services. Published frequencies for this system include:

854.9875 855.2125 855.2375 855.4875 855.9875
856.9625 856.9875 857.9875 858.9875 859.4375
859.9625 859.9875 860.4375 860.9625 860.9875

866.2125 866.4375 866.4625 866.8500 867.1500 867.3000
867.8125 868.7250 868.8625

Harpers Ferry National Historical Park, West Virginia

Amid the scenic backdrop of the Blue Ridge Mountains, the town of Harpers Ferry is located at the confluence of the Shenandoah and Potomac rivers and covers land in West Virginia, Virginia, and Maryland.

The heritage of Harpers Ferry is much more than a single date or individual. Its history involves several remarkable and unparalleled events and people that influenced the course of our nation's history.

In 1859, Abolitionist John Brown and his followers barricaded themselves in the town's armory during the final hours of their ill-fated raid. Today, John Brown's Fort, as the structure became known, sits in the lower town. Confederate forces converged on the town September 12-15, 1862, resulting in the largest surrender during the war, of more than 12,000 Federal troops.

Harpers Ferry is an excellent introduction to our nation's history and beauty. The town is accessible only by National Park Service shuttle bus from the nearby Visitors Center. This unique town has been restored to the Civil War era vintage. Many of the shopkeepers in period dress present talks on life in an occupied city in 1862.

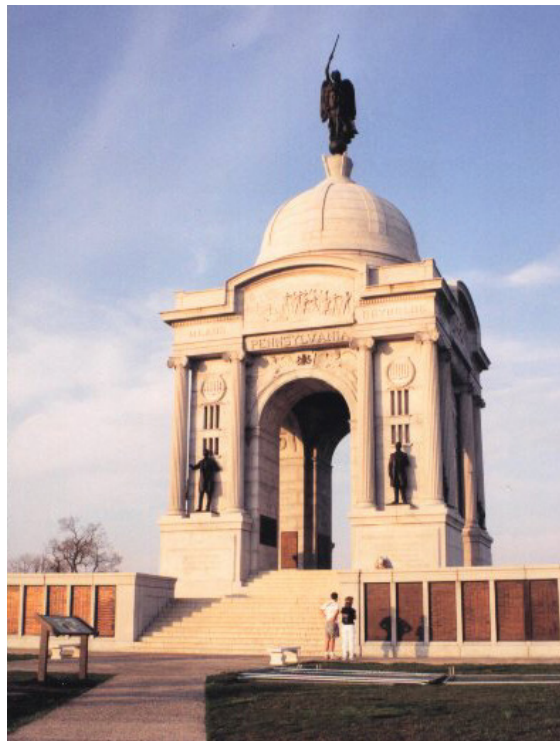
The park communications system has changed quite a bit in the last few years. The listing below reflects the system in current use.

Frequencies:

Park Rangers direct 168.425
Park Rangers repeater 168.425/169.175

Callsigns:

KQC722 Harpers Ferry (Headquarters)
KID784 Special Operations Activities 417.975 411.650



Gettysburg's Cemetery Ridge

You should also tune into the park's Travelers Information Service (KQC714) on 1610 kHz during your visit. It will provide you with valuable information about navigating around the park area and the NPS shuttle bus service information. You might want to also put the Harpers Ferry city frequency of 155.040 MHz into your scanner to keep tabs on local area activity.

Antietam National Battlefield, Sharpsburg, Maryland

My initial reaction to Antietam was one of awe, reverence, and sorrow. Located in the southwest corner of Maryland, the battlefield is one mile north of Sharpsburg, in Washington County. It is a battlefield of unspoiled beauty and preservation.

Following the success at Harpers Ferry, Confederate forces marched into Maryland. This was Gen. Robert E. Lee's first invasion on Northern soil, and would culminate with the Battle of Antietam or Sharpsburg, as the South called it.

Historians record that this battle became a turning point and changed the entire course of the Civil War. Wednesday, September 17, 1862, is the bloodiest day of battle in American history. This single day of conflict resulted in 23,000 men killed, wounded or missing. One in four men engaged in battle that day had fallen.

The loss of human life at Antietam shocked both sides engaging in battle. One soldier revealed later, "all sense of time was lost and even the desire for survival was set aside." For four bloody hours troops encountered repeated attacks from the Cornfield, the Sunken Road and over Antietam Creek.

The best way to view the battlefield is to take a self-guided driving tour. The tour road is 8-1/2 miles long with 11 stops. Audio tapes enhance the tour and may be purchased or rented from the bookstore. Park rangers regularly conduct talking tours out of the visitor center, and I highly recommend this as well.

Frequencies:

Park Rangers 166.950/166.350 (141.3 Hz PL tone)
170.050/169.400 (141.3 Hz PL tone)

Callsign:

KFB785 Antietam

While in the area you might want to monitor the Washington County sheriff department. You will find them in the VHF low band - 39.18 (F1) and 39.60 (F2). The county fire department also uses low band on the following frequencies: 33.820 (F3), 33.840 (F2), and 33.860 (F1).

Fredericksburg & Spotsylvania National Military Park, Virginia

Four major battles were fought in the vicinity of Fredericksburg, Virginia, resulting in 110,000 casualties. The park includes the Fredericksburg, Chancellorsville, Wilderness and Spotsylvania battlefields, and the Stonewall Jackson Shrine.

Fredericksburg Battlefield

The Fredericksburg Battlefield Visitor Center is located at the base of historic Marye's

Height on the Fredericksburg battlefield. Historians and Park Service rangers are available to answer questions and are exceedingly helpful to guide you to your particular area of interest.

Walking trails allow for walking over the battlefield terrain or a ten mile driving tour. Driving along the wooded park roads, you'll notice Confederate entrenchment lines, still visible after nearly 140 years. During the summer season regularly scheduled historian-guided tours are available. There is a fee and it includes entrance to the nearby Chancellorsville and Wilderness battlefields.

Unfortunately, Fredericksburg, like other battlefields, is being encumbered by nearby urban development. Residential housing is visible among some areas of the park distracting from the significance of the battlefield and remains an issue for many conservationists.

Chancellorsville Battlefield

Most historians recognize the Chancellorsville Campaign, conducted in the spring of 1863, as General Robert E. Lee's greatest victory. Without question, it was a battle of moral weakness for the Union and risk-taking by General Lee and Major General Thomas J. "Stonewall" Jackson, also resulting in the latter being wounded by friendly fire.

The Chancellorsville Battlefield Visitor Center is twelve miles west of Fredericksburg on Route 3. Slide shows are available as well as information on tours.

Despite its historical significance, Chancellorsville remains among one of the most threatened battlefields in the nation. The Chancellorsville battlefield is under constant threat from urban sprawl. According to Park personnel, preservation remains a top priority for the Park Service.

The Wilderness Battlefield

Besides the bloodshed of Antietam, the Wilderness battle was equally as massive. It was, by many estimations, perhaps more terrible. Maneuvering in tangled undergrowth and dense forest west of Fredericksburg, the two armies clashed May 5-6, 1864. In the midst of the fighting, the dense woods caught fire and thousands of wounded soldiers perished in the flames.

The Wilderness battlefield does not have a Visitor Center, but it does have an exhibit shelter located on Route 20 with a visual overview of the campaign. A park historian is present daily during the summer months and on most weekends in the spring and fall. Battlefield maps and information can be obtained from the Chancellorsville or Fredericksburg Visitor Centers.

Spotsylvania Battlefield

The Battle of Spotsylvania was a continuance of the Wilderness battle. General Robert E. Lee, aware that he was outnumbered, attempted to keep his army between Richmond and the Army of the Potomac. On May 8, 1864, troops of both armies arrived and began to create earthen

trenches and breastwork for cover. Most of the fighting took place in the center of the Confederate front. One such description from a Union officer observed, "it was chiefly a savage hand-to-hand fight, riddled by shot and shell."

The Spotsylvania battlefield also does not have a Visitor Center; however, the grounds are open from sunrise to sunset. Again, refer to the Fredericksburg or Chancellorsville centers for information. The park offers historian guided tours in the summer months.

Stonewall Jackson Shrine

Until his untimely death resulting from friendly fire at Chancellorsville, Major General Thomas J. "Stonewall" Jackson's military feat had elevated him to near mythical proportions in both the North and the South. Robert E. Lee decided his most capable general should recuperate in a safe place in nearby Guinea Station, Virginia, after he had been wounded by his own Confederate troops.

The Jackson Shrine is a white wood frame house — all that remains of the original Thomas C. Chandler's *Fairfield* plantation office building. The Park Service has augmented some of the furnishings used during Jackson's stay with reproductions and other pieces from the era to help recreate the last days of his life until he succumbed to pneumonia on May 10, 1863.

With four battlefields in the area the NPS communications systems is one of the most extensive I discovered on the trip.

Frequencies:

Park Rangers direct 166.950 (127.3 Hz PL tone)
Park Rangers repeater 166.950/166.350 (127.3 Hz PL tone)

Callsigns:

KID741 Chatham Heights	417.575 link (Headquarters/Visitor Center)
KID762 Fredericksburg	417.575 link (Maintenance)
KID764 Guinea	417.575/4172.50 link (Jackson Memorial Shrine)
KID781 Chancellorsville	417.375 link (Visitor Center)
KID789 Fredericksburg	417.575 link (Visitor Center)

Gettysburg National Military Park, Pennsylvania

After many years of Civil War study, I decided that Gettysburg was number one on my

list of battlefields to visit. Following their dramatic victory at Chancellorsville, Confederate troops began their march from camps around Fredericksburg northward into Maryland and Pennsylvania, followed unwittingly by the Federal Forces.

The engagement started on July 1, 1863, as elements of the two armies collided west of Gettysburg in the early morning hours. The fighting escalated during the day as more Union and Confederate troops reach the field. By 4 p.m., the Federal troops had been defeated and retreated through Gettysburg.

On July 2 the battle lines were drawn up in two sweeping arcs. The main portions of both armies were nearly one mile apart: Confederate forces along Seminary Ridge, Union forces on Cemetery Ridge. During the ensuing hours, battles raged in the Wheatfield, the Peach Orchard and Little Round Top, followed by evening attacks on Cemetery and Culp's Hill.

The final day of battle, July 3, opened with a two-hour Confederate artillery bombardment of the Federal lines. For a time, both sides engaged in a thundering artillery duel for supremacy, but neither side had any great success. However, in an attempt to recapture the partial success of the previous day, some 12,000 Confederates advanced across open fields toward the Federal center. In 50 minutes, 10,000 men involved in the assault had become casualties. The attack would forever be known as Pickett's Charge.

With the repulse of Pickett's Charge, the Battle of Gettysburg was over. The Confederate army retreated back into Virginia, spiritually and physically exhausted. More men fell at Gettysburg than in any other battle fought in North America.

The most tangible link to those three days in July is still the battlefield itself. Parts of it look much the same today as they did in 1863. Fences, hills, cannons and even the now present monuments provide an opportunity to reflect and understand what happened there. The best place to begin is the park Visitor Center that houses the Electric Map show, bookstore and museum.

Licensed NPS battlefield guides conduct program and tours. For information on various tours and attractions go to <http://www.Gettysburg.com>. For those going to Gettysburg this summer, the annual battle reenactment will be held July 5, 6, 7, 2002. For additional information, visit <http://www.gettysburgreenactment.com>.

Gettysburg is one of the most popular battlefield sites in the country; consequently, this park service communications system is quite busy at all hours of the day and night.

Frequencies:

Park Rangers direct 164.725
Park Rangers repeater 164.725/166.275

Callsigns

KFB754 Gettysburg (Adams County Dispatch)
KGB799 Gettysburg (Headquarters)



Confederate lines at Seminary Ridge

There are other interesting things to listen to while you visit Gettysburg. Here is a small sampling of frequencies you might want to program into your scanner.

Adams County Police	45.100	45.500	45.540
	45.780		
County Services	45.600	453.225	453.775
County Emergency Management	956.900		
Countywide Fire Communications	46.180 (F1)	46.200 (F2)	46.260 (F3)
	46.300 (Fire Police)	46.320	154.280
Gettysburg Police	45.380	45.500	45.540
Gettysburg College	151.745	154.570	154.600
	464.325	464.525	464.925
	464.975		
Gettysburg Tours	151.775		
Local Restaurant Kiosks	30.840	31.240	33.140
	33.160	33.400	35.020
	35.120	35.880	35.960
	151.745	151.775	151.805
	151.835	151.895	154.515
	154.540	154.570	154.600
	461.700	461.0125	461.3125
	461.3625	463.4625	
	464.2625	464.8625	
	469.9625		
Quebecor Printing	153.125		

Monocacy National Battlefield, Maryland

Known as the *Battle That Saved Washington*, the battle of Monocacy was conducted on July 9, 1864, in Frederick, Maryland. This decisive battle marked the last campaign of the Confederacy to carry the war into the north. Although this battle was a victory for the Confederates, it cost them a day's delay to march on the federal capital, and ultimately allowed Washington to bolster their defenses.

Battlefield attractions include special programs, walks, and special events through the summer, and additional information is available at the Gambrill Mill Visitor Center.

Communications for this battlefield are administered by the Antietam battlefield personnel. Look for their 166.950/166.350 repeater with 141.3 Hz PL tone.

Petersburg National Battlefield, Virginia

Petersburg, Virginia, was the setting for the longest siege in American history when General Ulysses S. Grant failed to capture Richmond in the spring of 1864. Grant and his troops surrounded the city, thus cutting off General Robert E. Lee's Confederate supply lines into Petersburg and Richmond. On April 2, 1865, ten months after the siege began, the Union finally claimed victory and Gen. Lee evacuated Petersburg. The final surrender at Appomattox Court House was but a week away.

Petersburg has two base stations associated with their system at Poplar Grove and their visitors center in Petersburg.

Frequencies:

Park Rangers direct 164.475 (141.3 Hz PL tone)
Park Rangers repeater 164.475/163.125 (141.3 Hz PL tone)

Callsigns:

KFB790 Petersburg (Headquarters)
KFB791 Poplar Grove (Area Station/Mobiles)

Appomattox Court House National Historical Park, Virginia

Our trip through history has taken us from Manassas and the beginning of the war to Appomattox Court House, Virginia, the place where it all ended on April 9, 1865. It was at Appomattox that Robert E. Lee surrendered his men to Ulysses S. Grant, general-in-chief of all the United States forces. Lee's surrender signaled the end of the southern states' attempt to create a separate nation.

Three days after the surrender, Union troops, regiment by regiment, saluted as the Confederates laid down their arms in Appomattox on a Virginia country lane. For the men of both sides their journey home could begin. For the nation it was a new beginning.

Today, the National Park Service manages this historical park in rural central Virginia. The site includes the restored McLean home, site of the surrender, and the village of Appomattox Court House. Uniformed park rangers or interpreters in period dress are available to answer your questions and provide information about the people that lived here.

This isn't a big park, so you won't find a repeater system in use. Look for callsign KID769 on their simplex frequency of 166.350 MHz

In Conclusion

My battlefield walks were especially satisfying and fulfilling. It was an indescribable experience to stand on the very ground where my ancestors and thousands of others had endured such great hardships. The battlefields of Antietam, Chancellorsville, Gettysburg, and several more are a part of my family history.

So why visit a battlefield? Because they are places that were turning points in our nation's history, ultimately by blood and suffering. Battlefields are the places where Americans sacrificed themselves amid the horrors of war for their respective causes, and created the country we have today.

To honor these Americans, we treasure those fields where they struggled, and pay homage to them by visiting those hallowed grounds.



McLean House at Appomattox Courthouse National Historical Park

Table 1: State Highway Patrols and Mutual Aid

Note: The frequencies below are not a complete or comprehensive listing for each state, but represent frequencies monitored during the trip.

Maryland State Police

39.100	Statewide Intersystem	Channel A01
39.340	Barracks O - Hagerstown	Channel A05 (110.9 Hz PL tone)
151.475	Portables	
155.190	Barracks-to-Barracks	
155.730	Mobile Extenders	

Note: A complete profile of the Maryland State Police system by Mike Agner can be found in the Monitoring Times website at: <http://www.grove-ent.com/EXMDSP.html>

Pennsylvania State Police

The Commonwealth of Pennsylvania is implementing a statewide, multi-agency radio network capable of supporting over 50 thousand users. This network uses a Motorola ASTRO SmartZone, type 2 digital system. While at Gettysburg (Adams County) I noted the following digital trunk signals in the 800 MHz band apparently in use by this system: 866.7625 867.0875 867.3875 868.1625 868.4125. Nothing was heard on any of the state's former VHF high band frequencies. Also watch for activity on these nationwide 800 MHz Inter-system frequencies:

866.0125 867.5125 868.0125 MHz

Virginia State Police

Primary operations may be monitored on the following frequencies:

154.665	Car to Car Simplex
154.695	Surveillance (Simplex)
158.985	Richmond, Salem
159.000	Richmond, Wytheville, Salem, Eastern Shore
159.135	Fairfax, Appomattox, Chesapeake
159.165	Culpeper, Appomattox, Wytheville, Chesapeake
458.350	Vehicle Repeaters
39.540	Virginia Law Enforcement Mutual Aid link to all sheriff's departments

West Virginia State Police

39.980	Statewide Sheriff's Net
42.060	Company C - Martinsburg
42.100	Statewide Police
42.260	Statewide Mobile

Table 2 Family Radio Service Frequencies

Channel	Frequency (MHz)	Narrowband FM
1	462.5625	
2	462.5875	
3	462.6125	
4	462.6375	
5	462.6625	
6	462.6875	
7	462.7125	
8	467.5625	
9	467.5875	
10	467.6125	
11	467.6375	
12	467.6625	
13	467.6875	
14	467.7125	

Shortwave's Summertime Secrets

By Dave White

Let's face it, summertime has a bad reputation when it comes to shortwave listening. After all, for the poor SWL, the only thing summer is good for is going to the beach and dreaming of wintertime DX, right? If you think summer is only for doing antenna work and catching up on that stack of *Monitoring Times* back issues, we have some good news for you. Popular wisdom notwithstanding, there are plenty of shortwave listening opportunities in the warm weather months, including some that are best suited for the lazy, hazy days of summer.

We know that signals in the shortwave spectrum reach distant points by virtue of "bouncing" off the ionosphere, that mysterious collection of charged particles located in the highest reaches of Earth's atmosphere. Scientists don't know exactly why, but this signal-bouncing ability of the ionosphere is directly influenced by the number of spots on the sun's surface where magnetic lines of flux converge. What is known for sure is that the more of these sunspots there are, the better the ionosphere refracts shortwave radio signals to points thousands of miles from where they originate.

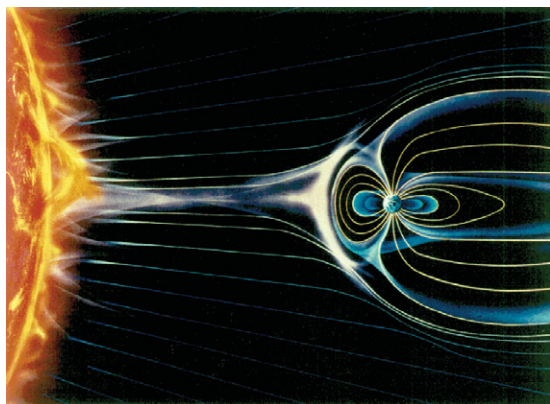
We thought that the current sunspot cycle (Cycle 23) had peaked for good in 2000 and was on the decline, but were pleasantly surprised when the sunspot activity started in-

creasing again early this year. This "double peak" phenomenon has been seen before, and bodes well for our summertime shortwave listening this year. The sunspot numbers are still high enough to support good shortwave broadcast reception on frequencies that wouldn't be usable at times when the sunspots are closer to minimum.

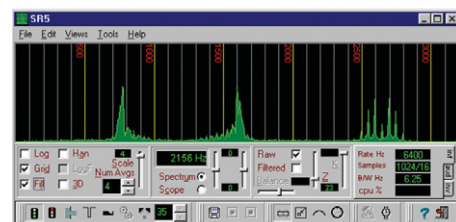
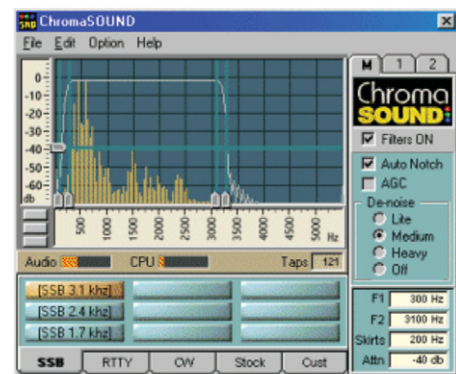
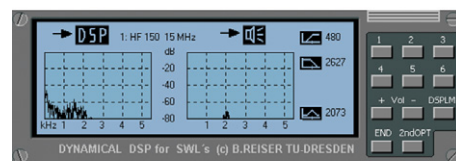
Several factors tend to affect listening to the shortwave bands in the summertime. One is the amount and intensity of natural static, including "crashes" associated with summer thunderstorm activity. Another is the angle of the Earth in relation to the sun during the summer months. The ionosphere is energized by the flow of charged particles from the sun known as the solar wind, and there is some evidence that this effect is dampened by the angle at which the solar wind meets the Earth's magnetic field at this time of year. It has also been observed that geomagnetic activity on the sun is at its minimum during June, July, and August.

The combined effect of all these factors on summertime listening is actually fairly small—an increase in static and less usability of lower frequencies in the daytime. Below 10 MHz, signals tend to be absorbed in the lower layers of the ionosphere during the daylight hours, rather than being reflected back to Earth, but at night they bounce around the world like crazy. Frequencies between 10 and 15 MHz are usable both day and night. Conditions on frequencies above 15 MHz are best during the daylight hours, because those signals tend to shoot completely through the ionosphere with little or no refraction at night.

The High Frequency Coordination Conference (HFCC) estimates that nearly half (45%) of international broadcasters plan to use frequencies at 11 MHz and higher during 2002, providing targets throughout the day and night on frequencies which work almost as well in summer as winter.



NASA depiction of the solar wind, which influences the ability of the Earth's ionosphere to reflect radio waves.



Dynamical DSP, Chroma Sound, and SR5 are examples of the software you can use to help tame summertime static on the shortwave bands.

Targets of Opportunity

It's important to remember that when it's summertime in the Northern hemisphere, it's winter in the Southern hemisphere, complete with winter propagation characteristics. Accordingly, you may actually have better success hearing signals from places like Australia, New Zealand, South America, and southern Africa when it's summer in North America.

Throughout Europe, summertime is the high season for music and arts festivals. Virtually every European broadcaster with an external service traditionally features these during their non-news broadcasts. Even if the native



The Budapest Farewell Carnival is typical of the many European summer festivals that are featured on summertime shortwave broadcasts. Photo: Budapest Tourism Office

language is something other than English, these cultural snapshots can make for very entertaining summer listening.

For sports junkies, Radio Australia typically offers extensive weekend coverage of the Australian Football and National Rugby Leagues throughout their summer seasons. English Premier League soccer play begins in August, and BBC World Service devotes a large chunk of its weekend *Sportsworld* program to coverage of key matches.

Ever mindful of the worldwide reach of radio signals and of the amount of tourist travel that takes place in the summer, international broadcasters tend to make programs about travel and tourism abundant at this time of year. See the sidebar accompanying this article for some listening targets for the armchair summer traveler.

Taming the Summer Static

Since summertime static is a phenomenon of nature, we can't eliminate it, but we can do a lot to lessen the amount of it that gets into our speakers and headsets. The advent of Digital Signal Processing (DSP) has put advanced audio processing within reach of even the slimmest radio hobby budget.

If you aren't fortunate enough to own a radio with DSP firmware built in, you still have some minimal-to-no-cost options. A computer with a sound card is all you need to utilize one of several varieties of DSP software available as demo, freeware, shareware, or reasonably priced alternative to a new rig. You should find that the filtering capabilities of any of these programs helps reduce both steady static and lightning crashes and their affect on the signal you're trying to copy. If nothing else, trying them out is a great way to spend a couple of lazy summer evenings. Just connect your radio's headphone output to your computer sound card's line input, download the software, and enjoy some hands-on experimentation.

Table 1: DSP Software Programs

BR Universal Filter <http://www.wh2.tu-dresden.de/~bernd109/amateurfunk/amateur.html>

Chroma Sound DSPFIL	http://www.siliconpixels.com/csnd/csnd.htm
Echo Filter	http://www.qsl.net/mmhamsoft/dsp/index.htm
FFTDSP	http://www.computeca.co.za/echofilter
GNASP1	64.119.173.164 http://members.tripod.com/~gniephaus/gnaspl/gnaspl.html
Hamview	http://padan.freelyellow.com
RadioCom	http://www.bonito.net/bonito/images/gbamateurfunk.htm
Sky Sweeper SR5	http://www.skysweeper.com http://www.ar5.ndirect.co.uk/html/sr5.html
Swezey Digital Filter	http://www.winternet.com/~swezey/dsp.htm
YVF 1.2.1	http://www.geocities.com/Athens/Cyprus/4345/PA.html

If you don't have a computer, or simply prefer a hardware solution, a number of out-board processing units – both digital and analog – are available. These are devices that connect between your receiver's external speaker output and an external speaker, and offer front panel filter, bandpass, and notch controls. Several manufacturers produce the units, including AOR, Autek, MFJ, and Timewave. Icom and Yaesu offer external speakers with adjustable audio filters built in. Used units, including discontinued models from Alpha Delta, Grove, and Radio Shack, can be found at hamfest flea markets and online auction sites.



Co-host Rachel Orr tries to get a comment for the record from a longtime resident of the Galapagos Islands for a segment of HCJB's "Studio 9". Photo: HCJB.

Make the Most of the Weather

Clearly, summer is the ideal time to tackle outdoor projects like putting up new antennas, and modifying or maintaining your old ones. A good (make that *really* good) ground will help reduce the amount of noise making its way to your receiver. Now is a good time to check your ground system, or put it in place if you don't have it.

Clem Small's *Antenna Topics* column in every issue of *MT* is an excellent source of tips, designs, theories, and great ideas for building new, and improving old antennas. If you include outdoor antenna work on your list of summer listening activities, please remember to keep SAFETY FIRST.

1. Keep antennas, guy wires, masts, and towers well away from power lines.
2. Work with a "buddy." You can use the extra hands – and the help if you get in trouble.
3. Check the weather and don't work if there's thunderstorm activity anywhere close by.
4. Wear whatever safety equipment is appropriate to the work you're doing – safety harness for tower climbing, hard hat, heavy gloves when handling metal guy wires, heavy boots when digging or pounding ground rods.

appropriate to the work you're doing – safety harness for tower climbing, hard hat, heavy gloves when handling metal guy wires, heavy boots when digging or pounding ground rods.

Another way to take advantage of summer weather and maximize your listening is to embark on a DXpedition. This can be as simple as visiting a nearby state park for a few hours, as involved as a vacation trip to an isolated island, or anything in between. The object is to get as far as possible away from sources of man-made noise, which, in a nutshell, means getting away from civilization and the attendant noises that interfere with radio listening (computers, electrical appliances, fluorescent lights, high voltage power lines, to name a few) and to provide space to get an antenna as long and as high as possible.



The National Slovak Theatre in Bratislava appears on one of the many Radio Slovakia International QSL cards that feature the country's tourist sites.

Obviously, you'll need a radio that can be powered by batteries, which means either a portable or a desktop model that provides a jack for external DC power (usually 12 volts). Take extra batteries and as much antenna wire as you can comfortably carry. Take a first aid kit no matter how long you plan to stay, and sufficient food, water, and other beverages to sustain you if you plan an extended session. This is one sport that can be enjoyed either alone or with others. Not only will you increase the possibility of hearing stations that have eluded you in your normal listening environment, you'll have an opportunity to be outdoors and enjoy nature.

So, now the secret's out. Summertime isn't such a shortwave wasteland after all. Quite probably, the notion that it is, stems from the fact that this is the time of year when we spend more time outdoors, away from our traditional listening posts, engaging in non-radio activities. Just remember, on a hot summer night when there's nothing better to do, a trip across the ocean is just a radio away.

ABOUT THE AUTHOR

Dave White, W4UVH (dave@k4cc.net) firmly believes that the best time for shortwave listening is when it's either light, dark, cold, or warm. It should only be done indoors, outdoors, while on land, at sea, or in the air, using whatever equipment and antennas that are at hand, cat whisker and crystal included.

Take a Summer Vacation on the *SS Shortwave*

By Dave White

Okay, so you don't have the budget for a summer vacation trip to the South Pacific, or a weekend fling in Paris. Not to worry. Once again, shortwave radio comes to the rescue, with plenty of opportunities to visit exotic ports of call without spending an extra nickel.

A picture may be worth a thousand words, but there's nothing quite like the sound of a Jamaican mountain waterfall, as heard in a recent KSDA-Guam "Travelogue" program, or the eerie ringing of cow bells to ward off evil spirits, featured in a segment of Swiss Radio International's "Swiss Mix."

Here's a sampling of English language broadcasts that are beamed to the Americas (unless otherwise noted.) Times are UTC, frequencies in kHz.

BBC WORLD SERVICE

Programs such as "Artbeat," "Arts in Action," and "Essential Guide" offer virtual trips all over the world. Refer to the BBC program schedules published periodically in *MT*, or the BBWS website at www.bbc.co.uk/worldservice/index.shtml

CHINA RADIO INTERNATIONAL

Listen between 1300 and 1600 on 7405, 9570 and 17720 for "China Horizons," "In the Spotlight," and "Life in China." A number of travel features are also available on CRI's website, www.cri.com.cn/

DEUTSCHE WELLE

DW's schedule includes several features on Germany as well as other European countries. Check the DW website, <http://dw-world.de/english> for the best times and frequencies to catch "Arts On the Air," "Living in Germany," "People in Europe," and "Inside Europe."

HCB- Ecuador

Travel destinations in Ecuador and throughout Latin America are featured daily during "Studio 9." Listen at 0100-0130 and 0400-0430 on 9745, 11960, and 21455 usb.

KNLS - Alaska

English broadcasts (0800-0900 on 11765 and 1300-1400 on 11870) are beamed to Russia and the Pacific, but you can listen to "Postcards From Alaska" and "American Highway" on the station's website, www.knls.org

KSDA - Guam

All broadcasts target the Asia Pacific region, but the weekly "Travelogue" feature is available on the station's website, <http://english.awr.org/>

RADIO AUSTRALIA INTERNATIONAL

Signals are intended for Asia and the Pacific, but are regularly heard in North America. RAI's "Pacific Beat" offers glimpses of the entire Southern Pacific region. Listen at 0500, 0700, 1800, 1900, and 2000. See the *MT Shortwave Guide* for the frequencies to try at those times.

RADIO AUSTRIA INTERNATIONAL

On Sundays, the "Report From Austria" program features a "Profile of Austria" segment at 0130 on 9870 and at 1530 on 17860.

RADIO BULGARIA

Listen for the Saturday night (2330) and Monday night (0230 Tuesday UTC) broadcasts on 9400 and 11700.

RADIO BUDAPEST

"Heading for Hungary" is a monthly feature heard during Radio Budapest's Sunday night (Monday UTC) broadcasts on 9560 at 0100-0130 and on 9570 at 0230-0300.

RADIO CAIRO

Monitor 9475 and 9900 on weekends, Tuesdays and Wednesdays at 0200-0300 and 2300-2400 for features on Egyptian tourism.

RADIO CANADA INTERNATIONAL

Canada's artistic and cultural life are in the "Spotlight," Sundays and Wednesdays at 1930 on 5960, 13670, 15170, and 15305.

RADIO EXTERIOR de ESPAÑA

On Sunday nights, food and travel are on the menu in REE's "Entremeses" segment. Try 6055 at 0000 and 0500 Monday UTC.

RADIO FRANCE INTERNATIONAL

None of RFI's English broadcasts are beamed to North America, but some of them can be received here. The broadcast to India and the Middle East at 1400 on 11610 and 17620 features a report on cultural events in France.

RADIO KOREA INTERNATIONAL

Listen for "Korean Kaleidoscope" and "Welcome To Korea" at 0200-0300 and 1130-1230 on 9560, 9650, and 15575. The programs are also available on the RKI website, <http://rki.kbs.co.kr/>

RADIO MEXICO INTERNATIONAL

Segments such as "Mirror of Mexico," "Mosaic of Mexico" and "Regional Roots" are featured during RMI's half-hour broadcasts at 0300, 0400, 1400, 1500, 2100, and 2200 on 9704.9 and 11770.

RADIO NETHERLANDS

Listen on Sunday, Wednesday and Thursday for "Aural Tapes-try" and "Dutch Horizons." Try at 0000, 1130, and 1500 on 5965, 6165, 9845, and 15520. Programs can also be heard "on demand" on the Internet, at www.rnw.nl/

RADIO POLAND

Features on Polish life and culture "Focus" and "Panorama" can be heard during the broadcasts at 1300 (6095, 7270, 9525, 11820), 1800 (5995, 7285), and 2030 (5995, 7165, 7290, 9540).

RADIO SINGAPORE INTERNATIONAL

English broadcasts are beamed to Asia, but are worth trying to catch for programs such as "Arts Arena," "Limelight," "Potluck," and "Snapshots." Try at 1100-1400 on 6150 and 9600.

RADIO TAIPEI INTERNATIONAL

On Friday night (Saturday UTC) at 0345 monitor 5950 and 9680 for Taiwan tourism features. You might also catch the

Saturday 1445 broadcast on 15265, even though it is targeted to Asia.

RADIO PRAGUE

On weekends, "Spotlight" and "The Arts" profile points of interest in the Czech Republic. Listen 0000-0027 on 7345 and 11615; 0100-0127 on 6200 and 7345; 0300-0327 on 7345, 7385, and 9870; 2230-2257 on 11600 and 15545.

RADIO ROMANIA

Tuesdays, Wednesdays, and weekends are the days to sample "Tourist News," "Visit Romania," "Radio Pictures," and "Romanian Itineraries." Try at 0200-0300 and 0400-0500: 9510, 11940; at 0600-0700: 9635, 11940; at 2300-0000: 11740, 15105.

RADIO SLOVAKIA INTERNATIONAL

Every other Monday night (0100-0130 Tuesday UTC) RSI features tips on visiting Slovakia on 5930, 6190, and 9440.

RADIO VLAANDEREN INTERNATIONAL

Belgium's contribution to SW travel programming is "Tourism in Flanders," airing on weekends during RVI's 2200 and 0400 hours on 15565.

SWISS RADIO INTERNATIONAL

Check SRI's website, www2.swissinfo.org/ for schedules and audio files of "Swiss Mix" and "Out and About," which feature life in Switzerland.

VOICE OF ISLAMIC REPUBLIC OF IRAN

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Radio Direction Finding Championships

Story and photos by Joe Moell, KØOV



Mike Pendley K5ATM of New Mexico uses an air loop to get bearings on 80 meters. Notice the vertical sense rod alongside the loop, to help determine which of the loop's "figure-8" nulls is toward the fox.

Where is that signal coming from? Every radio enthusiast is curious about the source of some mystery signal from time to time. Some are taking that curiosity to the next level. Not only can they track down the sources of these signals with simple directional antennas, they have turned it into an international sport.

In April, two dozen of these hidden transmitter hunters gathered in a large forest near Pine Mountain, Georgia, to test their equipment and skills. Who would be best in the country at tracking and navigating on the run? What kind of equipment did they use? Read on, and maybe you'll decide to join in the fun.

Radio direction finding (RDF) is almost as old as radio itself. Marconi built a crude direc-

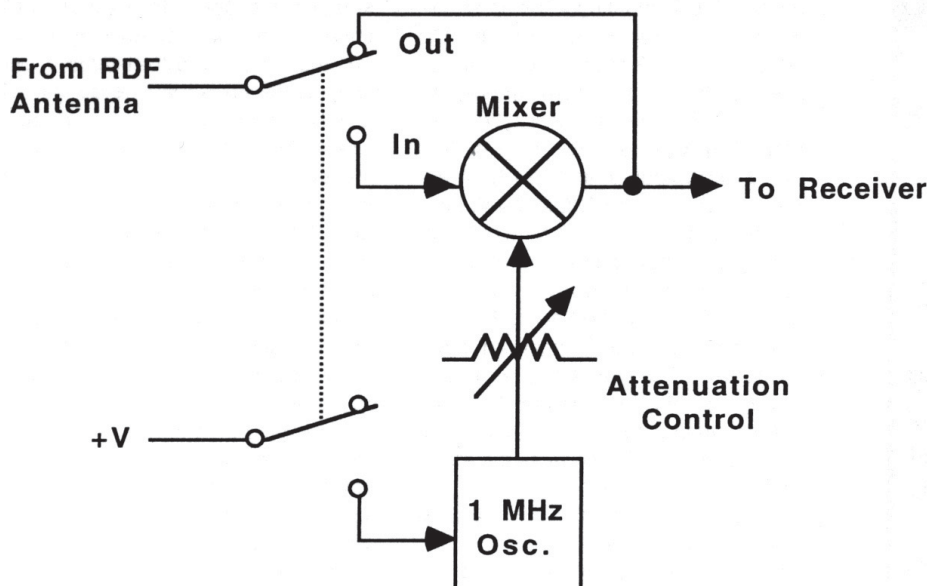
tional antenna array for the *HMS Furious* in 1906. Then two fellow Italians, Bellini and Tosi, perfected loop antennas for sharp and accurate signal bearings. RDF is said to have changed the course of history soon afterwards, allowing the British to secretly track the movement of German ships in the First World War.

Not long after the war, amateur radio operators discovered the fun of finding spark transmitters at their gatherings, using only crystal diodes and earphones. By the mid-fifties, citywide transmitter hunts in RDF-equipped cars were popular weekend events. The fun continues to this day, and there's a good chance that a group of "T-hunters" or "foxhunters" is near you.

Europeans and Asians began hidden trans-

mitter hunts in the 1970s, but they preferred to do it almost entirely on foot. Challenges between towns and later between entire countries led to the first world championships of "foxtailing" in 1980. Rules for the competitions were agreed upon by the national amateur radio societies of all the countries and published by the International Amateur Radio Union.

Other popular terms for this on-foot sport are "radio-orienteeing" and "ARDF" (Amateur RDFing). The ARDF World Championships now take place every two years, with about 25 countries and 250 competitors in attendance. The next will be in Slovakia during September 2002. Team USA will be there for the third time. Team members are selected by their performance in national trials, such as the April events in Georgia.



An offset attenuator is similar to the front end of a superheterodyne receiver, where the incoming signal is shifted to an intermediate frequency. In this case, the output signals are at the input frequency plus and minus the oscillator frequency, at levels controlled by the attenuation potentiometer.

Ready, Set, Grab That Bearing!

Imagine yourself at the starting tent of the US ARDF Championships. It's seven minutes before your published starting time and you are called up to the table where an official hands over your punch card and numbered bib, which you attach to your shirt. Five minutes before start time, you are given a color-coded orienteeing map of the hunt area, encompassing 2000 acres. You can also pick up your RDF gear from the impound tarp, but you can't turn it on yet. Two minutes before start time, you are instructed to go 100 yards up the marked corridor to the start triangle. When you hear the horn, you can turn on your gear and start taking bearings.

Five "fox" transmitters, all on the same frequency, are somewhere in that forest. When the horn launches you from the start, #1 is just coming on the air, sending "MOE MOE MOE" in slow Morse code. Sixty seconds later, it goes off and #2 comes on, sending "MOI MOI MOI" for exactly a minute. Then it's #3's turn to send "MOS MOS MOS" and so forth through MOH

and MO5, after which the entire cycle repeats continuously.

You don't understand Morse? No problem, just count the dits. E is one dit, I is two, S is three, H is four and 5 dits is 5. There's no doubt which transmitter is on. They are all out in the open with orienteering flags attached, but the foliage may keep you from seeing them until you're just a few feet away. When you find one, mark your competitor card with the special punch attached to the flag stand and hurry off toward the next.

If you are in a prime age category (20-39 for men, 20-34 for women), you are required to search for all five transmitters, in any order.

The more you find and the sooner you get to the finish line, the higher you will be in the final standings. Finders of all required foxes are listed first, with the shortest times winning the medals. Finders of all but one fox in the category are listed next in order of time, and so forth.

Besides the prime age categories for men (M21) and women (F21), there are separate categories for youth under 20 (M19 and F19), men 40 to 49 (M40), women 35 to 49 (F35), men and women 50 and older (M50 and F50), and men 60 and older (M60). Competitors in all non-prime age categories are required to find only four foxes, except for M60 and F50, which have three required. You can't pick for yourself which fox or foxes to skip – that is determined by the official rules and is different for each category.

If you learned orienteering skills in the Scouts, they will come in handy as you use your map and compass on the ARDF course. The shortest straight-line path to all five transmitters and then to the finish is typically 5 to 7 kilometers. The foxes may be close to mapped trails, but don't count on it. The finish line is clearly marked on the map and there is a beacon transmitter on a separate frequency nearby, so you can navigate your way home by RDF if you get lost or lose your map.

Even if you think you're doing well on the course, keep an eye on your watch. There is a time limit, announced in advance. No matter how many foxes you have found, you are disqualified if you cross the finish with an elapsed time over the limit. Do you have time to go after that last fox?

You don't have to have an amateur radio license. Even if you have one, you're not allowed to transmit while on the course.

Gearing Up for Foxhunting

National and world ARDF championships have two separate foxhunts, on separate days. For the first, the transmitters are on the two-meter ham band, with the Morse code sent as audio tones on a continuous AM carrier. Here in the Western Hemisphere, narrowband FM



Bob Frey WA6EZV of Ohio catches a quick 40 winks before his late starting time. On the impound tarp are a wide variety of home-built and commercial 80m RDF sets, including air loop and rod antennas.

often replaces AM so that competitors can use their usual two-meter handi-talkies for receiving.

Although there are sophisticated RDF methods for VHF, including doppler and time-difference of arrival sets, almost every radio-orienteer ends up choosing a simple, rugged, directional antenna to use with a scanner or handi-talkie. The most popular are three-element yagis and two element phased arrays, often called HB9CV's in honor of their inventor. Getting a bearing is as simple as holding it properly while turning in a circle, or sweeping it back and forth, while looking and listening for maximum signal either by ear or on the receiver's S-meter. It's the same as pointing a rooftop VHF or UHF broadcast receiving antenna for best picture on a TV set.

When signal is strongest, your VHF RDF antenna is pointed toward the transmitter. Well, not always. If you live in an area of hills and mountains, you may have discovered that pointing your outside TV antenna toward one of them can give a better picture than pointing in the exact direction of the TV transmitter tower. The same is true in VHF transmitter hunting.

If you're not line-of-sight to the fox, the best bearing may be in the wrong direction, toward a signal-reflecting hill or building. Hunters combat this unwanted "multipath" phenomenon by taking their bearings from the highest places whenever possible. They also take lots of bearings from many locations while on the run and play a "mental pool game" with the contour lines on the map, trying to guess how hills and canyons are reflecting and guiding the signals. It's not easy to explain, but it's a skill that can be acquired and sharpened with lots of practice.

As you close in on the fox, the signal becomes very strong. The S-meter "maxes out" and you are no longer able to get a bearing by ear. Now the signal has to be knocked down (attenuated). Ordinary resistive attenuators do the job at some distances, but when you get within about 200 yards, the RF will bypass the attenuator and enter the receiver through its case,

once again making bearings indistinct and unreliable.

The solution is a different kind of signal-reduction device, one that converts the knocked down signal to another frequency that the receiver can handle without overload from through-the-case leakage. Figure 1 is the block diagram of a simple "offset attenuator." Key components are a packaged 1 MHz crystal oscillator (also called the Local Oscillator or LO), a potentiometer, and a diode that serves as mixer stage. It all fits in a small plastic box, connected in the coax line between the RDF antenna and VHF receiver or scanner.

With the switch in the OUT position as shown, you get bearings as usual by tuning to the signal frequency. Let's say it's 146.565 MHz, the most popular channel for two-meter transmitter hunting in the USA. When it gets too strong, set the switch to IN position, tune the receiver to 145.565 or 147.565, and adjust the attenuation control for about mid-scale on the S-meter. Now you can easily get a directional bearing again. As you approach the transmitter, continue to reduce the LO level into the mixer with the attenuation control. With an offset attenuator and a good receiver, it's possible to get over 100 dB of effective signal reduction, enough to get bearings even when inches away from a moderate power fox.

In European and Asian countries where foxhunting is popular, complete ARDF sets with antenna and receiver mounted together are available to buy, either in kit form or ready to use. Instead of an offset attenuator, the receiver includes a wide-range internal RF gain control circuit. On the tarp at the championships in Georgia, I saw such receiver/antenna sets from Japan, Australia, Russia and Ukraine. Competitors mail-ordered them directly or got them via world-traveling hams. Almost all use headphones instead of a speaker. Some have additional features such as audio-pitch S-indication. As you swing the RDF antenna, varying signal strength causes the pitch of a tone in the headphones to rise and fall. This makes it easy to take bearings on the run, because you don't have to slow down to watch a meter.

Another Day, Another Band

The other international ARDF band is 80 meters. Transmitters send the same MOE, MOI, MOS and so forth, but in on-off keyed Morse. Because TV colorburst crystals are plentiful and cheap, the most popular frequency is 3579.5 kHz. Hunts are held in remote enough areas that RF radiation from TV sets on that frequency does not interfere.

All the rules and procedures for 80-meter radio-orienteering are the same, but the competitors' times are almost always about 25% faster. It's not due to experience gained the day

before, because the hunt is in a completely different section of forest. On-foot hunters do better on 80m because the multipath that can plague VHF direction finding isn't present at 3.5 MHz.

Unless you're standing right under a long power line or within inches of a big metal fence, the bearing you get on 80m is almost always accurate. It doesn't matter if you're on a hill-top or deep in a canyon. Like daytime signals from AM broadcast stations, 80m groundwave signals follow the curvature of the earth and aren't reflected or scattered by terrain features.

Wavelengths of 80m signals are far too long to make yagis and HB9CV's practical, so about half of competitors' RDF sets have the same type of loop antenna that Bellini and Tosi used almost a century ago. The loop, usually about 7 inches diameter and held vertically, has a "figure-8" directional pattern. Reception is strongest in the directions of the plane of the loop. Output is minimum (a null) when it is oriented such that the signal comes directly through the center of the loop.

Antennas on the other 50% of typical 80m ARDF sets have many turns of wire on a rod of ferrite material. It looks and works just like the rod antenna in your AM broadcast receiver. There is a sharp null when either end of the rod "points" toward the signal source. This is analogous to the air loop, because the signal is going through the center of the turns of wire in this orientation.

As you turn both air loops and rod antennas to get bearings, the signal peaks are broad and the nulls are very sharp. Foxhunters use the nulls to determine the signal direction most accurately. There is no multipath to fill in the nulls as there would be with loop antennas on VHF.

Though very accurate, the loop and rod

patterns are ambiguous. A null toward the north means that it's equally likely that the signal is coming from the south. If you're starting from an edge of the hunt area, this isn't a problem, but in the middle of the woods you need a way to make sure that you haven't passed by a fox.

To resolve the ambiguity, 80m ARDF sets include a vertical sense antenna, such as a telescoping whip or dangling wire. When switched into the circuit, its signal combines with the signal from the rod in proper phase to alter the directional pattern, making one of the two signal peaks much stronger. The mix is not so perfect as to create a cardioid (one peak, one null) pattern, but it is good enough to easily tell which of the two figure-8 pattern nulls to follow.

Fun with a Purpose

Besides providing fun, exercise, and camaraderie, transmitter hunting is a useful skill for every ham and monitoring enthusiast. Almost exactly the same VHF RDF techniques are used by biologists and researchers to track radio-tagged animals, as you have probably seen in nature shows on TV. Search and rescue volunteers, including many hams, track the Emergency Locator Transmitters (ELTs) of downed aircraft this way, too.

Then there are those mystery signals. Whether they are from malfunctioning equipment or malicious individuals, if they interfere with legitimate communications, they need to be found. RDF-savvy volunteers can play an important part with equipment that's easy to construct.

For VHF, you can build "steel-tape yagis" out of a measuring tape, PVC sprinkler pipe, hose clamps and coax. Tape elements are favored by radio-orientees because they won't get permanently bent or broken as you crash through the brush. Good directional performance is limited to about a 3% frequency range, so you'll need separate yagis for the aircraft band, two-meter ham band, VHF marine band, and so forth. But at about \$5 each, that's no problem. More construction details are on the Web, as are plans for an offset attenuator that you can make for about \$15 from parts available almost everywhere.

For tracking stations and noise on amateur radio and shortwave bands below 30 MHz, the loop/sense principle is practical, provided that the signal arrives by groundwave. It doesn't work well on skywave (skip) signals, especially high-angle signals from stations less than 750 miles away.

Hidden transmitter hunting on the ham bands can be an enjoyable way to acquire a skill that provides important public services. Only the hider needs to have an FCC license. That means you can take your kids foxhunting, or perhaps an entire Scout troop. What better way to introduce them to the fun of radio monitoring while giving them some good exercise – and map-reading skills – at the same time.

The next USA ARDF Championships are being planned right now. Maybe I'll see you there!



For RDF on HF bands such as 80 meters, an external loop/sense antenna can be attached to a multi-mode hand-held receiver like the Icom IC-R10. Charles Scharlau NZ0I of North Carolina made this one.

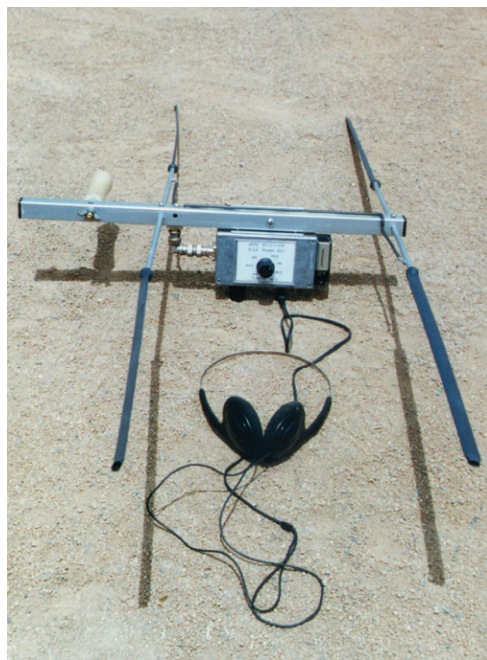
For More Information

At the author's Web site (<http://www.homingin.com>), you will find:

- More about the Second USA ARDF Championships, including many photos and a link to the complete results.
- More about "international-rules on-foot" foxhunting, including local radio-orienting events, USA's team for the World Championships, and plans for a \$15 build-it-yourself offset attenuator.
- More about mobile T-hunts, including rules, frequently asked questions, equipment ideas, improvements, and modifications to commercial sets.
- Over 200 links to local T-hunt and radio-orienting groups, RDF project sites, and equipment suppliers.

ABOUT THE AUTHOR

Joe Moell, K0OV is an electronics engineer who has been on hundreds of hidden transmitter hunts since his first at age 12. He is co-author of the book *Transmitter Hunting - Radio Direction Finding Simplified* (published by TAB/McGraw-Hill) and has written over 160 articles on the subject. Joe serves as national ARDF Coordinator for the American Radio Relay League and puts on regular radio-orienting practice/training sessions in southern California. His e-mail address is k0ov@homingin.com



This HB9CV antenna and attached two-meter ARDF receiver with wide-range gain control is available, as a kit or wired, from Ron Graham Electronics in Australia.

RDFing Teamwork: FCC plus Hams

By Robert Gonsett

The outskirts of Fallbrook, California, were hit by a devastating fire in February 2002. One month later a mysterious source of interference hit Fallbrook's primary fire dispatch frequency. Division Chief Milt Davies, KD6UBA, of the North County Fire Protection District, recognized the interference to his fire department's primary dispatch channel as on-channel jamming, and he knew he needed outside help.

This was no stuck mike. He was dealing with a signal that was largely unmodulated but would be pock-marked with strange data-like bursts. Sometimes the jamming transmitter was on-the-air more or less continuously. Sometimes it was on and off. Sometimes it was off for long periods of time and only transmitted for a few seconds in bursts. There was no pattern to the madness.

The Federal Communications Commission and local hams were called into action to get to the heart of the matter. First, permanent FCC direction-finding stations on the West Coast were operated by remote control from Washington, D.C. in an attempt to pinpoint the source of the interference. However, because some of the DFing pods were down for servicing, only one line-of-bearing was obtained. The hidden transmitter could be anywhere along a 45 mile path.

To home-in on the location, members of the Palomar Amateur Radio Club were asked to listen to the fire dispatch frequency and give signal strength reports on the unmodulated carrier. It soon became clear that the FCC's mobile DFing activity – the next phase of the investigation – should begin in the vicinity of the City of Vista, CA.

Soon, an FCC direction finding vehicle appeared on the scene, operated by Bill Zears, District Director of the FCC's San Diego Field Office. Unfortunately, the jamming signal was weak at the locations where the DFing work began. So Bill drove to Fallbrook, got a good bearing, and that sent him into the rugged eastern portion of Vista, a place with private roads and locked gates. Complicating matters was the fact that the hidden transmitter had decided to go silent for long periods of time, making DFing more

challenging. Then a fire broke out on Marine Corps Camp Pendleton, which is right next door to Fallbrook – underscoring the need to clear Fallbrook's frequency as soon as possible. The jamming had in fact blocked communications between the Fallbrook fire crews working the Pendleton fire and their dispatch center.

Finally, enough DFing information was available to pinpoint the jammer to a 30 foot tower atop a hill in east Vista – a hill protected by a series of locked gates. Local residents believed the site was operated by the local water company, but the company's emergency phone number dead-ended into an answering machine.

A call to the Vista fire department reached a Battalion Chief who offered immediate assistance. He was already up to speed on the interference, thanks to a contact earlier in the day from a local ham radio operator. Then another ham chimed in and recalled that the City of Vista,

back in its pre-800 MHz days, had a transmitter up on the suspect peak. That old transmitter just happened to share Fallbrook's current VHF dispatch frequency! The pieces of the puzzle were beginning to fit together.

Soon, a caravan of vehicles headed up the hill to investigate, with the Vista fire department opening the gates. Once at the site, in a locked outdoor equipment box, was Vista Fire's old VHF transmitter with the AC power still turned on – even though the radio system had been abandoned long ago. The crew lost no time in confirming that the box discovered was indeed the culprit, and they shut off the AC power. A long day's work had come to an end.

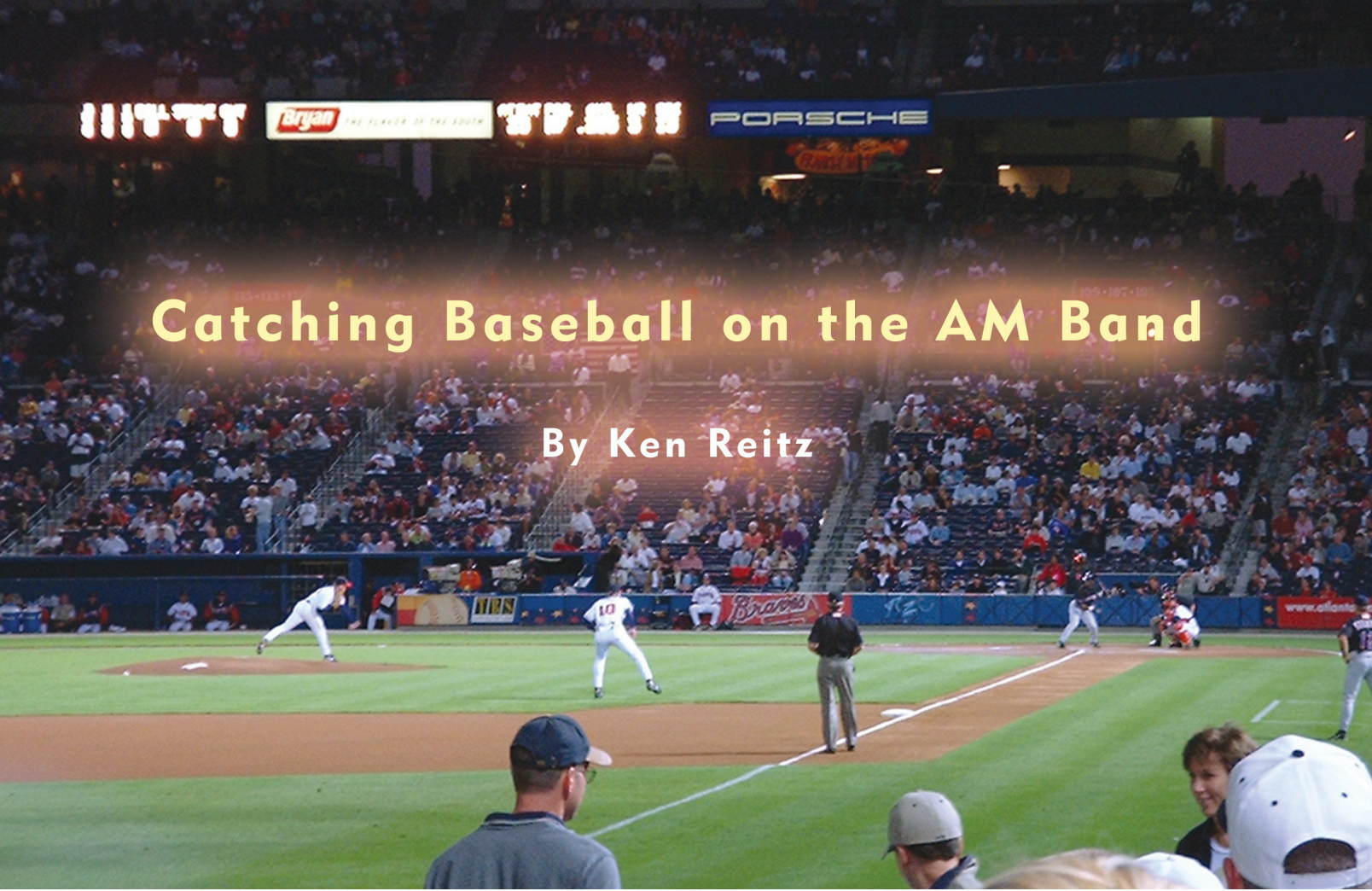
If you have ever wondered what the FCC considers a high priority case, now you know. They're out protecting our public safety frequencies, and working long hours to do it. Dedicated FCC agents are priceless; and so are hams (*and public-minded radio hobbyists - ed.*). In this case, it was a ham who recognized that the Fallbrook fire department interference was co-channel jamming. When outside help was needed, hams quickly zeroed in on the jammer's general location. Another ham brought the Vista fire Chief up to speed ahead of time, even though no one then suspected that Vista's old fire radio would be the culprit. Once the jamming site was identified, it was a ham who recalled the old Vista fire transmitter on that very spot, and the information was passed along to the FCC.

In short, hams represent a vast national resource in knowledge and skill, and their efforts helped speed the resolution of this public safety interference case. The reason the Vista transmitter turned itself on is still a mystery, but a rat's nest was spotted in the bottom of the equipment cabinet. Those critters are known to eat through and short out just about anything, and their copious fluids are conductive and corrosive.

If there is a moral to this story, it is to always deactivate or remove unused radio equipment. Even if you have a radio system that you want to keep around for a while as a contingency, pull the power or

yank the coax. Murphy lives.





Catching Baseball on the AM Band

By Ken Reitz

Americans have been listening to baseball on the radio for over 80 years and, throughout the period, technology has always threatened to change that. To be sure there are many FM stations around the country carrying the games, but it's on the AM band that you'll hear most of the action. The advent of "web-casting" has delivered on the promise to change the way we listen to baseball. But, to do so you'll need a pretty good computer, a fairly high speed connection and of course you'll have to pay for the privilege. The most expensive part is still the computer, but the on-line monthly fees, like cable bills, are always on the way up. The big drawback with listening this way is that it's not exactly portable.

Two years ago you could have listened to the games on your computer for free (if you had a computer and if you didn't count the monthly access fees). Last year Major League Baseball® saw fit to take control of the broadcasts and charged fans \$10 to sign up for the season: certainly not an exorbitant price. This year they're charging \$15. Want to guess what it'll be next year?

You might have thought that XM or Sirius satellite radio would finally be the technology that brings baseball fans what we really want, to have all 30 Major League® teams playing every game in high fidelity and in a portable mode. But, you would be wrong.

MLB® will see to it that the terrestrially based AM broadcasters, who have paid dearly for the rights to carry the games in early 20th century technology, will be protected. So, if you're a baseball fan and you don't have a fancy computer, you might as well look at your AM reception options.

The More Things Change

You would think that with today's surface mount technology, superb low noise circuitry and pure silicon magic, tuning in the big flagship stations of Major League Baseball would be a snap. However, there are now more than 4,700 AM signals jamming the air on virtually every inch of the entire, and newly expanded, AM dial. This makes reception of previously easy AM target stations more difficult.

It's hard to believe that here on the threshold of the 21st century we're still trying to figure out the best ways to receive AM band radio signals, but, as baseball fans, we are. And, oddly enough, the further we get from KDKA's first radio baseball broadcast in 1921 the more we employ the reception technology from that era. Indeed, AM loop antennas (see review on page 87) are still coming onto the market and the Beverage antenna (circa 1922) remains the most effective DX antenna for the band. The last resort in the AM band DXers bag of tricks is the mod-

ern outboard filter.

The basics are these: If you live within 500 miles of the targeted MLB flagship station (see chart) you can have reliable reception for the duration of the game (provided, of course, it's a night game) using just about any AM radio and a tunable loop. I live within 500 miles of the New York Mets, the New York Yankees, the Pittsburgh Pirates, the Baltimore Orioles, the Cincinnati Reds, the Cleveland Indians, and the Atlanta Braves. Based on my location in Virginia, and my radios and my antennas, I am able to listen to all of them with a reliable signal throughout most of the game. In fact, in my transceiver I've put all those stations in the memory bank so I can just click and scroll through the games one after the other. Keep in mind that at night most AM stations go to a directional pattern of transmission, the lobes of which may put you out of reach of a quality signal.

The further away you are from the station you want to listen to, the harder you'll have to work. At 800 to 1,200 miles away you'll need a more sensitive (i.e. expensive) radio and a much more sophisticated antenna. Again, from my location, with the full coverage receiver in my ham transceiver and an all band antenna, I can expand my baseball reception list to include the Chicago Cubs, the Chicago White Sox, and the St. Louis Cardinals. Among the missing will, of course, be

those stations with relatively low power such as the Detroit Tigers' WXYT and Tampa Bay's WFLA. A real challenge will be receiving the Spanish language stations, which for the most part are locals only.

And, finally, for cross-continental reception, you'll need a top grade radio, a serious AM band antenna, some electronic gadgetry and great propagation to pull in the games. However, it's unreasonable to expect reception such as that which you enjoy from stations within the 500 mile radius.

The Hardware

As a shortwave listener you may already have an excellent 50 kHz to 30 MHz radio such as the products made by Icom and Kenwood, and these make excellent AM band receivers. But, personal circumstances may force you in different directions for an antenna. If you live in a condo or an apartment you need to consider using the aforementioned loop or MJF's 1020 Active Antenna. This little box with its amazing 17" whip brings a lot of signal to your receiver under minimal conditions. As a bonus it also tunes through the entire HF spectrum.

If you've got the room and want to pick up particular flagship stations outside the radius that ordinarily gives satisfactory reception, you'll have to put up an external antenna. The antenna needn't be too far off the ground; just keep it away from electric lines. The best set-up for an ordinary suburban lot is a long wire antenna plus the use of a filter device such as the MFJ-784B tunable digital signal processor (DSP). The 784B uses digital circuitry and filters to take out unwanted signals and reduce general noise on the band.

If you have room to spread out, you should consider a Beverage antenna, which at 500 to 1,500 feet long can perform amazing feats of AM band reception. You'll need to get your map and compass out and plot the exact direction of the station you want to receive. Armed with this kind of highly direc-

tional antenna, a great radio, a DSP and good propagation you might be amazed at what you'll hear! You might also consider running two longwire antennas at right angles to each other and using an MFJ-1025 noise canceling signal enhancer to tune out unwanted signals on the same frequency coming in from other directions.

Remember, reception results will vary from place to place which is why it's nearly impossible to predict what your reception results will be in your given location. My results were obtained using three receivers ranging in price from \$100 to \$500 and using four different antennas: a Radio Shack AM loop, an MFJ-1020C active antenna, a multi-band off-center fed dipole at 136ft. long at a height of 40ft. and a terminated "mini-Beverage" 220ft. long at a height of 6ft. oriented to the east. These results were obtained over several hours on different nights over a two week period under a variety of seasonal weather and band conditions. Notice, too, that some of these flagship stations are on the same frequency, thus compounding an already difficult tuning endeavor.

Even if you can't get the flagship station, there's a chance you can receive one of the many stations in that target team's affiliate list. For an updated list of MLB team affiliates check out this web site: <http://www.geocities.com/baursam/mlb.html>.

As the season progresses and we get into the playoffs, you'll be able to watch the games on TV, but turn down the sound and listen to the audio as it was meant to be heard: directly from the radio booth in the press box.



Will Grove at the game with the "other" grandparents.

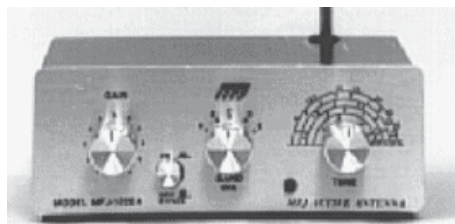
DXing Baseball on the AM Band

Team	Call Sign	Frequency (kHz)	Notes
AMERICAN LEAGUE			
Anaheim Angeles	KIAC	570	
Anaheim Angeles	XPRS	1090*	
Baltimore Orioles	WBAL	1090	
Boston Red Sox	WEEI	850	
Boston Red Sox	WLYN	1360*	
Chicago White Sox	WMVP	1000	
Cleveland Indians	WTAM	1100	
Detroit Tigers	WXYT	1270	
Kansas City Royals	KMBZ	980	
Minnesota Twins	WCCO	830	
New York Yankees	WCBS	880	
New York Yankees	WADO	1280*	
Oakland Athletics	KFRC	610	
Seattle Mariners	KIRO	710	
Tampa Bay Devil Rays	WFLA	970	
Texas Rangers	KRLD	1080	
Texas Rangers	KESS	1270*	
Toronto Blue Jays	CHUM	1050	

NATIONAL LEAGUE

Arizona Diamondbacks	KTAR	620	
Atlanta Braves	WSB	750	
Atlanta Braves	WWWE	1100*	
Chicago Cubs	WGN	720	
Cincinnati Reds	WLW	700	
Colorado Rockies	KOA	850	
Florida Marlins	WQAM	560	
Florida Marlins	WQBA	1140*	
Houston Astros	KTRH	740	
Houston Astros	KRTX	980*	
Los Angeles Dodgers	KXTA	1150	
Los Angeles Dodgers	KWKW	1330*	
Milwaukee Brewers	WTMJ	620	
Montreal Expos	CKCK	620 (French)	
New York Mets	WFAN	660	
New York Mets	WADO	1280*	
Philadelphia Phillies	WPEN	950	
Pittsburgh Pirates	KDKA	1020	
San Diego Padres	KOGO	600	
San Diego Padres	KURS	1040	
San Francisco Giants	KNBR	680	
San Francisco Giants	KZSF	1370*	
St. Louis Cardinals	KMOX	1120	

* Indicates Spanish broadcasts



An array of outboard electronic products can improve AM band reception (Courtesy: MFJ Enterprises)

® Major League Baseball believes that they own all words associated with what you thought was America's Pastime.

Antenna Experiences and More Questions

In this column over the last year and a half there's been a running discussion about an off-center fed dipole which, because of its construction, is an all-purpose HF antenna for SWL and amateur radio activities. It was last described in the January '02 issue of *MT*. More recently, in the April issue, I related the fabled effects of using a Beverage antenna for long wave and medium wave stations. Both have generated a fair amount of response and this month I'd like to share some of the thoughts, experiences and additional questions sent in by *MT* readers.

◆ "Killer" Results on Low Band

The April column, entitled "'Killer' Antenna for Low Band DXing" prompted this response from long time *MT* contributor and current *Short Wave* magazine propagation editor Jacques d'Avignon: "During our Miscou [Canada] DXpedition last fall, we [Jacques, fellow avid low band DXers Ken Alexander, and *MT*'s own Kevin Carey] used Beverage antennas and had spectacular reception on MW and LW. The antennas were simply laid on the ground: not one tree or bush in sight! The Beverages were between 500 and 1,100 feet each. The ground at the far end was a 6 foot copper

ground rod. The bottom 2 feet of these rods were in salt water as we were only a few hundred feet from the ocean! Talk about good quality ground! On LW we logged 19 countries...and on MW we logged over 26 countries."

For those who are intrigued by this sort of reception Jacques has some additional advice: "If you have the space the Beverage antenna is the way to go, but they are directional. If the antenna is NOT terminated it is bidirectional. In order to make it unidirectional you have to use the termination. If you want to get real fancy, use a variable termination at the end of a two wire Beverage..."

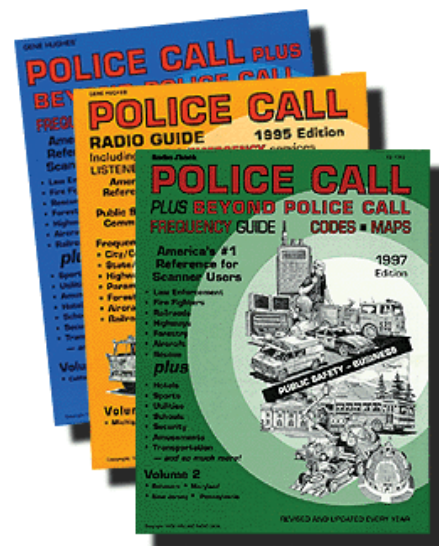
For more details on the Miscou DXpedition, including loggings and audio files, see Ken Alexander's web site at <http://dexpedition.tripod.ca/>. For another view of the DXpedition read Kevin Carey's Dec. 2001 column *Below 500 kHz*.

In addition, *MT* reader Dave Palitsch writes: "...for reasons not in my control, I am not able to build a terminated Beverage but I have erected a longwire 100 meters in length...It definitely has improved the reception below 6 MHz...When propagation is decent, I am able to intercept signals and monitor transmissions like never before..." Dave credits the help of another SWLer, George Maroti, who Dave says is a real pro, and "...some good info from the website <http://www.hard-core-dx.com>" for significant noise reduction using the Beverage.

Hard upon the deadline for this column, but anxious for some low band DXing of my own, I quickly rounded up the longest piece of antenna wire I could find (220 feet) along with a couple of six foot stakes for antenna supports, and a ground rod with a 300 ohm resistor attached between the antenna and the rod. Dashing through the woods, getting snagged on blackberry briars and dodging the crop of poison ivy, I quickly hooked it up for some DX fun.

Using my trusty, if ancient, Kenwood TS-140s, I zipped through the long wave frequencies and logged 17 previously unheard beacons, including CLB 216 kHz, Wilmington, NC, and YMW 366 kHz Maniwaki, Quebec. I logged Bechar, Algeria, at 153 kHz, French broadcaster France Inter on 162 kHz, and Nador Medi-1 from Morocco on 171 kHz, all of which I had never heard before. Cruising through the AM band netted several nice catches – enough to start me thinking about setting up a real Beverage, and I hope you will, too.

Incidentally, I also found that during the daytime my "mini" Beverage easily doubled signal strengths on AM stations in a 100 mile radius as compared to my GTAB (see below). Check out Clem Small's *Antenna Topics* column from Jan. '01 on building and operating a Beverage and check Kevin Carey's column monthly for new long wave loggings and see if you can bring 'em in.



You can't tell the players without a program and Police Call for your area can save countless hours of frequency searching. (Courtesy Police Call)

◆ All-band Signal Catcher

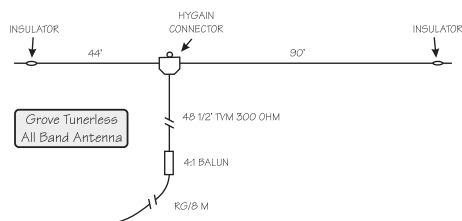
For those with less room to spare and more interest in the upper reaches of the HF bands, the antenna I call the Grove Tunerless All-Band (GTAB) really fits the bill. Designed by *MT*'s own Bob Grove and based on other off-center-fed antenna designs, this antenna gives terrific performance on HF down through the AM band. It's considered "tunerless" because if you were to transmit with it on the ham bands you'd find that it exhibits a 2:1 or better variable standing wave ratio (VSWR) across the bands (except the 160 meter ham band). With it, you'll be able to receive a good portion of the frequencies listed in the *Short Wave Guide* found in the center of this magazine from 2-30 MHz. The fact that it doesn't load up on 160 meters



String an antenna on the beach and listen to the DX roll in. DXers at this Canadian location snagged 19 countries on Long Wave. (Courtesy Ken Alexander and Jacques d'Avignon)

doesn't mean that it doesn't receive well on that band; it does.

The real worth of this antenna is demonstrated by *MT* reader Jon Lippert who writes, "...I am a ham working on a shoe string budget...as of now I do not have an antenna tuner and it could be a while before I can afford one. That is what interested me about the antenna in the article..." Yes, you can save up to a hundred dollars as a ham by building this antenna and not buying a tuner.



Chris Walker K5AV, wanted to know if the GTAB could be modified to be used on 160 meters. I asked RF guru Bob Grove about this and he suggested simply doubling the length of the two legs of the antenna (88' and 180' respectively). I actually tried this last winter and found it didn't work any better than the shorted version. I hope other readers will let me know what their experiences are.

Several readers, including Ted Gurley, Francis Donovan, and Steve Mandel, among others, had construction questions. Most had to do with the dimensions of the antenna (which is 134 feet long and 40 to 50 feet high) and how to accommodate the antenna in their own circumstances. There's also concern about operating high output (1,000 watts) through the antenna.

Generally, the higher you can put an antenna the better it will operate (receive/transmit). However, this typically means 20-50 feet, because most of us end up having to use trees for supports and that's about how high we can (a) throw or (b) climb without the aid of a "cherry picker." With the GTAB antenna, height is important because the 48.5 feet of 300 ohm TVM wire needs to be off the ground. Additionally, it needs to be in a relatively straight line between the two supports. Sometimes that, too, is impractical, so we all just do the best we can. My antenna is not high enough off the ground for the 48.5 feet to be straight up. So, the balun is brought over to a tree and fastened. Still, it operates very well. If there's simply no way to put this antenna up, you might do as Ted Gurley suggests and go to the shorter G5RV which is about half as long.

As to power capabilities, Bob Grove says, "...I don't see why it wouldn't take full amateur power provided he use a large enough balun and heavy-duty twinlead. I think the twinlead would be the limiting element, but if he tried to use wider-spaced ladder line, I don't know what that would do to the SWR."

Just how well does this antenna perform? Well, the first one I had up for over 10 years with no visible signs of deterioration. The

second one I put up just this past winter, and I have worked ham stations all over the world on it using only 100 watts. In just two months this spring I worked 34 countries, without even trying, ranging from South Africa to Java and Belarus to Belize. It's a thrill to hear a 100 watt signal from halfway around the world and have them hear you. You can imagine how well it brings in the international broadcasters!

◆ Other Questions

MT reader Joshua Shapiro has an R10 HF-UHF hand-held receiver and wants to know about what other users are hearing on the various bands. He also wants to find local fire, airport, police and medical frequencies for Westchester County, NY.

First, I suggest a quick trip to Radio Shack to pick up a copy of *Police Call*. It's a yearly listing of all the various public service frequencies used by agencies in your particular area. They cost \$20 and are well worth the price. If you don't have *Police Call* it really is like looking for a needle in a haystack. While at your local Radio Shack store, ask if they have an unofficial sheet of active local frequencies.

Second, check out the R10 Reference page (<http://www.coloradosprings.tv/scannerdweeb/r10/index.htm>) which has links to some very useful R10 related sites. On the "Strong Signals" site you'll find a short (10 page) list of the general band plan for all the familiar scanner frequencies (<http://strongsignals.net/access/content/faf.html>). Also make note of *MT*'s currently-running "Who's Who in the Radio Spectrum" series, especially the June 2002 and upcoming August installments on VHF/UHF. These will give you an idea of where the various services tend to operate, but for specifics for your area you'll need *Police Call*.

And, finally, there's a use group for R10 users on Yahoo which should give you all the info you need and a great place to ask all of your specific R10 related questions (http://groups.yahoo.com/group/Icom_R-10/messages). There are many R10 users there who can give you tips they've learned from their own experiences. I would also recommend the 2001 *MT* Anthology CD which contains a lot of searchable data on scanning frequencies for more off-beat listening such as satellites, etc.

Lastly, *MT* reader William Andrade wants to know more about external filtering devices for shortwave radios. He writes, "...there are so many choices out there, it really is a daunting task to make an informed, wise choice. Should I choose the MFJ-1026, ANC-4, MFJ-784B, MFJ-1040B...?"

You're right, William, so keep your eyes peeled for future issues of *MT* for reviews on various SWL aids. I did a review of the MFJ-784B, which I found to be a very effective filter, which appeared in the March 2000 issue. Keep in mind that we *MT* writers are at the mercy of the manufacturers and are provided with evaluation units as they see fit. Usually the products have to be returned quickly, making it difficult to evaluate a product over a long period of time without simply buying it our-

selves, which we rarely can afford to do.

You readers could help: If you have invested in a particularly useful accessory, we invite you to write it up in a review or account of your experiences with it and send it in to editor Rachel Baughn. Whether it's a full-length review or a short recommendation, your hands-on account could help folks like William who are wondering which accessories to buy.

Featured *MT* Staff Website:

<http://www.w9wi.com>

TV Technical Information for DXers hosted by Doug Smith

News

TV Database

- By channel
- By state/province
- TV and FM in the US Pacific
- TV frequencies worldwide

FM/TV DX Links

History Links

DX organizations

Government links (US, Canada, Mexico and other)

Original articles and software by Doug Smith

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Who invented radio?

The first answer to this question is, "Not Guglielmo Marconi." This question was also recently addressed by Don Bishop, Editorial Director of *RF Design* magazine (February 2002, p.10). Let's look at Don's chronology:

For several decades beginning in 1858, a West Virginia dentist, Mahlon Loomis, experimented with wireless telegraphy; he was granted a patent in 1873, a year before Marconi was born.

In 1885, Amos Dolbear, a physics professor at Tufts University, was granted a patent of wireless telegraphy which blocked Marconi from operating in the U.S. Marconi finally had to buy Dolbear's patent to be commercially viable.

In 1888, Sir Oliver Lodge began experimenting with wireless telegraphy at Liverpool University in England; he received a patent in 1897 for the coherer detector which was purchased by Marconi in 1911.

Also in 1888, Heinrich Hertz demonstrated in his Berlin classroom the production and detection of electromagnetic waves as had been mathematically predicted earlier by James Clerk Maxwell.

In 1892, Nathan Stubblefield, a Kentucky farmer, gave a private demonstration of his wireless telegraph; a group of witnesses saw the system operate in 1902.

In 1895, Alexander Popov announced in Russia that he had transmitted and received wireless telegraphy for a distance of 600 yards, the same year that Guglielmo Marconi conducted a similar experiment on his father's estate in Italy.

Also in the mid-1890s, Harold Fessenden was broadcasting voice and music to pleasure vessels on the St. Laurence River, graduating to broadcasts in 1906 from Brant Rock, Massachusetts, to ship operators hundreds of miles offshore.

Marconi may have patented equipment, demonstrated techniques and applications for radio, and developed marketing, but he didn't invent radio (actually, according to Bishop, no one "invented" radio; it is a natural electromagnetic phenomenon).

In 1943 the U.S. Supreme Court invalidated Marconi's patents in view of Tesla's prior descriptions. By then, both were deceased.

Who invented regenerative receivers?

"I was surprised that, in your answer to Roger Henderson's question about regenerative receivers (*MT* May 2002) that you credit Lee DeForest with the invention of the regenerative receiver. All the accounts I have read indicate that it was Edwin H. Armstrong and not Lee DeForest who invented the regenerative detector. See for example, *The Continuous Wave: Technology and American Radio, 1900 - 1932* by Hugh G.J. Aitken, Princeton University Press; *Empire of the Air*, Tom Lewis, Harper-Collins;

and many articles which have appeared in "The Old Timers' Bulletin," published quarterly by The Antique Wireless Association.

"It is true that after protracted battles through the courts, the patent for the regenerative vacuum tube amplifier and oscillator was awarded to DeForest, but most, if not all, radio engineers at the time considered this to be a miscarriage of justice. DeForest seems to have stumbled accidentally on the fact that his audion amplifier would oscillate at audio frequencies if care was not taken to avoid feedback, but he apparently never understood why, and he never applied this idea to increasing the gain of a vacuum tube amplifier by using positive feedback, below the level required for oscillation, nor did he try to create an oscillator at radio frequencies. In fact, DeForest insisted that there was no RF present in the plate circuit of a triode tube functioning as a leaky grid detector!"

"Armstrong had theorized that feeding back RF from the plate circuit (which he called the wing circuit) to the grid circuit would result in increased amplification and he reduced this to practice by inserting an additional coil in the plate circuit. In sharp contrast to DeForest, Armstrong seems to have known exactly what he was doing.

"Worn out from fighting court battles for years over priority for inventions that were rightly his, in 1954 Armstrong committed suicide by jumping out of a 13th floor window. Bearing this in mind, I think the least we can do for his memory is to give credit where credit is rightly due."

— Sincerely, Derick Ovenall, N3EGR

Thanks for the interesting insight on the regenerative issue. I note this additional commentary from *A History of Radio* by Steven Schoenherr:

"De Forest began the longest lawsuit in radio history in 1915 when he sued Armstrong over the basic regenerative patent, but lost in 1921 and 1923 when it was demonstrated in court that De Forest could not explain how or why his audion tube oscillated; Armstrong did understand and made a clear explanation of regeneration. De Forest would win the final court battle in his 13th lawsuit in 1930, on a technical interpretation of the words used to describe oscillation, and was awarded the basic radio patent, causing him to become known as the 'father of radio'."

I suspect that the issue of "first discovery" for a wide variety of original radio circuits will remain cloudy indefinitely due to the frenzy of experimentation and rushing to get patents during the early days. In this perspective, whether or not De Forest should be disallowed "discovery" because he didn't understand what he had devised may be semantic. Certainly Armstrong

should be – and is – credited with superregeneration and the superheterodyne, both of which are vast improvements over the simple regenerative circuit, and show a better understanding of the principles involved.

Q. I've been told that circuit breakers are unreliable and don't always trip at their rated current. Is there a "fudge factor" built into circuit breakers? Do they "slow blow" like similar fuses? (Mark Burns, Terre Haute, IN)

A. Conventional electro-mechanical circuit breakers do change with age; some trip more easily ("nuisance tripping"), and some don't trip without significant over-current, if at all. While there are special-purpose, time-delay, circuit breakers, conventional household breakers typically break within a fractional second of excessive current, allowing for start-up "in-rush" currents required by electric motors and other appliances.

"Fudge factors" vary from manufacturer to manufacturer; most trip at their rated current, while some allow as much as 120% of their rated current before tripping.

An extensive test was done by Rome Air Development and reported in their RADCR-TR-83-108 ("Reliability Modeling of Critical Electronic Devices"). RADCR develops reliability prediction models for MIL-HDBK-217, a specification used by all of the military services; it's based on over a billion hours of comparative fuse and circuit breaker service time.

The study revealed that 38% of circuit breaker failures are in the shorted mode (thus continuing to supply current), 38% open, 19% unstable, and 5% arcing. Since a fuse simply melts (opens), it is three times more likely to do its job than a circuit breaker. And less than 1% of fuses short when they melt, making them considerably safer than a circuit breaker when it must dependably open the circuit because of overload.

Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of MT, or e-mail to bgrove@grove-ent.com. (Please include your name and address.) The current Ask Bob is now online at our website: www.monitoringtimes.com

Getting Started

Bright Ideas

Gary Webbenhurst

P. O. Box 344, Colbert, WA 99005-0344

ab7ni@arrl.net

Some of the most needed bright ideas are solutions for those who are physically challenged. I found it difficult to anticipate their needs without walking a mile in their shoes. I tried maneuvering around the radio room without eyesight: I have so many radios, it was difficult to remember what radio was where, and how to operate it. I put some duct tape around my hands. I also imagined what it would be like to not have full mobility, to be limited to a wheelchair. Any of these disabilities changes everything.

Clearly, it makes more sense to consult those who have already dedicated much time and thought to these special needs than to start from scratch.

61

First, I searched the internet. As expected, there were several helpful sites:

<http://www.mtn.org/handiham/>
<http://www.geocities.com/CapeCanaveral/1728/>

<http://www.rac.ca/handi.htm>

There are also dozens of support groups at :
http://dir.groups.yahoo.com/dir/Cultures___Community/Groups/Disabled

Here is a new group just started by an MT reader.

<http://groups.yahoo.com/group/DARH>

"I created the Disabled American Radio Hobbyists (DARH) to bring together disabled Americans who enjoy the radio listening hobby. Members can share logs, hobby related web sites, articles or ask questions. There really is no limit to DARH. DARH also welcomes those who wish to represent amateur radio, as well as TV DXers." Ryan

62

The most obvious aids are radios with large buttons and large displays. Examples are the RS Pro 2036 and Bearcat 895XLT. Does anyone know of Braille key overlays for radios? Larger knobs could be homebrewed by a sighted, able friend. For hams, Kenwood and ADI mobile radios have microphones with very large buttons.

63

There are some radios with voice synthesizers such as the Icom 3220, Kenwood G707 and TM-7V. They use the optional VS-25. I have one for my G707 and it works well as a mobile radio. I can hear the frequency etc., without looking at the display.

64

HandiHams has a long history of advocating and assisting handicapped hams.

Contact them at <http://www.mtn.org/handiham/index.html>.

65

Ham radio Volunteer Examiners (VEs) are always ready to make special considerations in taking the amateur tests. Just let them know ahead of time.

66

A friend of mine is confined to a wheelchair. Tom has a home crafted special holder on his wheelchair to keep his HT radio at the ready. He uses a big 12 volt marine battery for his mobile. It is recharged with a timer. It requires virtually no daily intervention.

67

Just bought a new radio? Are you going to sell the old one on eBay? Perhaps you can donate your old radio rather than sell it for few bucks. It might interest a handicapped person into our hobby.

68

Friends can help others by programming a radio for a blind or physically challenged hobbyist. Think about it: how would you program a radio if you could not see, or use your fingers to press the program keys? It hard enough for regular listeners to figure these out, and press the correct key strokes. It would be nice if the operators manuals were available in MP3, or other audio format.

69

I suspect those who are blind or otherwise challenged have long since found many ways to cope. This column is probably meant for those of us who need to raise our awareness or perhaps introduce a handicapped friend to our hobby. My best idea is for those of you with tips or information to send it to me at the address in the top heading. I will use your ideas and comments in a future column. We must make our radio hobby available to everyone. I hope you will help in this endeavor.

70

Can you convert scanner buffs into SWLs? Or imagine short-wave listeners (SWLs) listening to the local fire calls? If you are already a "cross listener" then you know about the new generation of hybrid radios that can receive both. The



Icom R series have very broad band capabilities. Most impressive is the cost. The R-2, and Yaesu VR120 are well under two hundred dollars. The Yaesu VR-500, and Alinco DJ-3X are around \$225. These radios hear from 500 kHz to above 1 gigahertz. True, they do not follow trunked 800 systems, but what do you expect for under \$200? They are even computer programmable. I love them so much, I own all four! See Photo.

72

If you are not currently a short-wave listener, give it a try. Radios are relatively cheap. You can buy a radio from Radio Shack or Grove Enterprises. If it does not entertain you, you can return it. Often the local public safety activity dies off by 2am on weekdays, but that's when things just heating up around the globe. If you are reading this, you are just a few pages away from the best source available anywhere on SWL. Just check out the center pages of this fine magazine.

73

Some good SWL websites for beginners:

<http://www.cybercomm.net/~slapshot/speedx.html>

<http://www.dxzone.com/>
<http://www.dxing.com/tips.htm>

74

The 4th of July is the busiest radio traffic day of the year. Holiday highway travelers, camping, outdoor activities, boating, and of course the fires... I mean, fireworks. Beginning the night of the 3rd and continuing through the weekend you will find exciting listening. Find a high place to view the fireworks and for the best long range scanner reception. You won't be disappointed.

75

July 28th is the Airshow at Fairchild AFB here in Spokane, WA. Look for the guy with the baseball hat with callsign AB7NI. I will be on 147.555 simplex. Don't be shy, say hello. See you there.

Scanning While Tanning

We have a number of ways to enjoy your hobby this month in conjunction with summer activities: going to fairs and concerts, hanging out at the airport, or listening (and watching) at NASCAR races.

◆ On-Scene Commander: Miami-Dade Fair

I had the pleasure of meeting The Alley Cats, "America's Premier Doo-Wop Group," during their performance schedule at the Miami-Dade County Fair and Exposition. What started as an average event monitoring task quickly changed into my most enjoyable outing of the year. The Alley Cats, with Mando Fonseca, Royce Reynolds, John O'Campo and Sean Devine, sang to standing-room-only crowds and exemplified the Fair's multi-cultural, family atmosphere.

I spoke with the Fair's staff about administrative communications and with The Alley Cats about wireless microphones.

Off-Stage at the Fair

Nancy Cooper, Assistant Director of Print/Publicity and Jay Baum, Risk Manager, provided their generous hospitality and a wealth of information about the Fair's communications.

"We have 52 permanent employees. That grows to over 500 employees during the Fair. We hosted 800,000 patrons over 18 days," Jay advised. "With 86 acres (of fairgrounds), communication is absolutely necessary. I don't think I can survive (the Fair) without the communications."

One may expect such a glowing testimonial from a radio salesman, but hearing it from the end-user is more meaningful. Several hundred radios are on-site, and every department at the Fair has an allocated inventory and channel. In addition, Conklin Shows, the Fair's ride concessionaire, also has an on-site radio network, as do most of the independent food vendors and show promoters.

"We're still just a county fair," Jay told me. "We have roasted corn, cows, and agricultural education. Kids need to see that milk doesn't just come from the grocery store."

Jay is very much aware of scanners for business and hobby use. His son was a newspaper photographer who monitored police and fire channels all the time, and Jay himself now listens in on his son's current occupation as a



firefighter.

"I'm real sensitive to scanning, especially for risk management issues," Jay advised. While accidents are inevitable in crowd situations, emergency response and risk management documentation can be hindered by improper radio procedures or incorrect information dissemination.

Jay's on-duty concerns include false emergency calls, the incorrect interpretation of calls, and incorrect documentation of calls. The news media, more so than scanner hobbyists, may overreact to these calls before they are fully investigated.

As an example, Jay pointed to the online webpage of the local fire department, where active fire and rescue calls can be seen by anyone on the Internet. Fair patrons have been known to call 911 (via cellphone) and report that a ride is stuck or faulty, when in fact it's just being stopped to assist another fairgoer.

The online call screen may indicate a potentially severe and hazardous crowd rescue situation when no such circumstance exists...but it will take many minutes before that call is cleared from the screen. For discussing these events with staff, Jay currently promotes telephone communication, but he's also looking into wireless messaging and data terminals.

Radios are an integral part of the Fair. Concerning the staff, "Everyone wants a radio. Every year it seems we have to buy more." But, as Jay said early on, they can't survive without them.

Staff Radios

via OptoElectronics Scout and scanning:

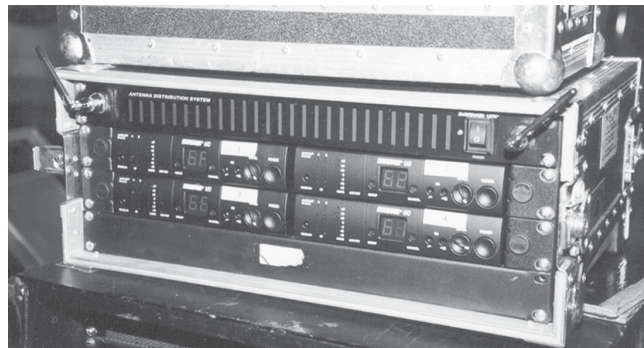
461.9125	Channel 1, Electrical
461.3375	Channel 2, Concessions
471.9375	Channel 3, Operations and Talent
463.5375	Channel 4, Security
463.6375	Channel 5, Parking
(Unid. Freq)	Channel 6, unspecified
461.6875	Channel 7, Administration
(Unid. Freq)	Channel 8, unspecified
(Unid. Freq)	Channel 9, Exposition Hall

Additional channels found:

453.2000	Miami-Dade County Fire-Rescue
461.5125	midway rides and concessions
462.1000	trams
462.5500	concessions
463.7125	concessions
464.4375	unid.
464.5000	unid. (common itinerant)
464.6125	concessions
470.3625	unid.

The Back Lot

Creating a radio version of a Neighborhood Crime Watch program is the goal of the Central Sentinel security program. Sponsored by the National Independent Concessionaires Association (NICA), this project seeks to increase security and awareness for carnival workers and families. "This is only an enhancement to security," according to Sharon Schrock, Member Services Coordinator for NICA.



The Alley Cat's wireless mic system

Many fairs include off-site camping areas for personnel. While this may conjure up visions of untidy "carnies" in beat-up trailers, the business has actually matured into a very respectable, professional and profitable industry. Cleanliness is no longer an issue, and housing is often in the form of \$100,000 customized motor coaches.

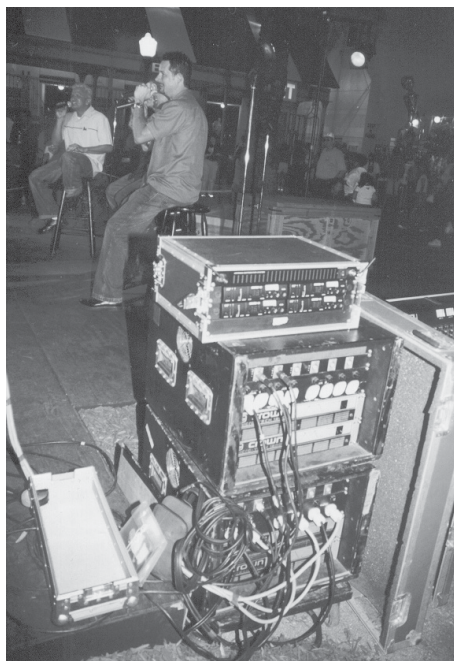
Nevertheless, campgrounds may be remote, dark, and sporadically patrolled by local law enforcement agencies. The wireless system allows off-duty workers to instantly report suspicious incidents to concession and carnival managers. The program was started about four years ago, but has gained accelerated interest due to recent events.

Fairs are unique, according to Sharon. "People come for the shows, livestock, specialty foods and rides they can't see anywhere else. We provide education and family entertainment." Helping to keep everyone safe is another outstanding byproduct of the concessionaire industry.

150.57 NICA Central Sentinel channel
(used nationwide at fairs)

On-Stage at the Fair

"We use a Shure UC-series UHF wireless system," said John O'Campo, the group's audio guru, "with Shure Beta 58 microphones. These are dynamic microphones and professional grade. We chose that particular mic and Shure in general (because) the quality is really good. I'd say they have some of the most durable micro-



phones."

The group's four microphones transmit to a half-rack receiver unit built into a custom travel case. A power antenna distribution component is part of the system, all terminating with a wiring harness or "snake" that plugs into the venue's

audio mixing console.

"Equalizing vocals, just vocals, is a whole different ballgame," explained Royce Reynolds about the differences between a cappella performances and vocal groups with accompanying instruments. "It's very specialized... To really have it perfected, there's a one in a million guy (audio technician or engineer). He probably would have been in a group or already worked with a group, a cappella, to really nail it. We have to have full dynamic range."

The staging also makes a difference, according to John. Florida's heat and humidity affect the sound quality, for instance. "Foot tapping on a wooden stage will be picked up by the mics. It's about 5 to 80 Hz, a really low range." The low end of the audio spectrum is often filtered by the group, except for the bass vocalist's mic, to avoid such problems. The microphones are attenuated at about 110 Hz.

Regarding the utility of wireless systems, John continued, "Because our show is a spontaneous show, and we never know what is going to happen from song to song, [wireless mics] allow us the flexibility to move around the stage freely."

The group has never experienced a range problem, since they always stay well within the published range specification of 300 feet between the microphone and receiver. John also said that most professional stage performers have switched to UHF systems, leaving the older VHF equipment for small lectures and other shows. Similarly, interference from other microphones or UHF television stations is of little concern. Interference is detected automatically by the system's receiver, and a simple change of channels resolves any problems.

Interestingly, Shure's website has an article about using scanners to troubleshoot wireless microphone systems at <http://www.shure.com/support/technotes/app-scanners.html>. Also see:

<http://www.shure.com/support/technotes/default.htm> for audio acoustics

http://www.shure.com/booklets/intro/intro_to_wireless.html for wireless mic operation

<http://shure.custhelp.com> for frequency lists

Some of The Alley Cats channels were:

- 83.125 Group 6 Channel 1
- 783.750 Group 6 Channel 2
- 788.750 Group 6 Channel 6
- 804.125 Group 6 Channel F
- 782.125 Group 7 Channel 1
- 783.000 Group 7 Channel 2
- 787.250 Group 7 Channel 6
- 789.000 Group 7 Channel 8

◆ Who's Listening? Elena Machado

She's a professional singer and actor. She's a model. She's a pilot. She designed her home using a 3-D floorplan software package, then decorated and furnished it for an exact match. She's dabbled in studies of aviation, photography, computer graphics, website design, criminal justice and civil investigations. She's a confident shot with her 9mm Smith & Wesson Model 6906. She's been in movies and musical stage

performances, and even recorded her own CD.

"Diverse" is an understatement for Elena Machado, who divides her time between Southern Florida and Southern California. This is a woman who attacks each item of interest and doesn't rest until she masters it.

Elena discovered scanners while working at Biscayne Helicopters and taking flying lessons in the mid 1990s. A Radio Shack desktop model constantly monitored the tower and ground frequencies at Kendall-Tamiami Executive Airport in Miami-Dade County, Florida, while another two-way radio was used for air-to-ground Unicom communications with Biscayne's fleet of helicopters.

Elena decided that having her own scanner would benefit her flight lessons, plus be handy for Civil Air Patrol (CAP) missions and exercises that she participated in at the time. A Radio Shack handheld was purchased (model unknown), and she was thrilled with the ability to hear local air traffic control frequencies, weather advisories, FAA Flight Check aircraft and occasional military aviation communications.

She continued with her flying lessons, eventually soloed, then went on to become familiar with five types of fixed-wing aircraft and four types of helicopters. Her CAP experiences included survival training, search and rescue certification, first responder training, incident command training, mutual aid coordination and specialized navigation.

"I first thought listening-in was so cool, like I was doing something I shouldn't be doing," Elena recalled. "Then, it just became 'normal' to drive around and monitor aircraft, CAP, police and other frequencies."

Today, Elena does more transmitting than casual monitoring. FRS radios are frequently used on-location at her singing and modeling "gigs," and she still flies touch-and-go's to stay proficient in airplanes.

continued on page 85



Elena wouldn't be caught at the airport without her Sporty's JD-100 aviation scanner.

ScanCan reaches the Atlantic Ocean

Scanning Canada's flying tour of the nation's airports has traveled all the way across this vast land from the Pacific Ocean to the Atlantic Ocean. Our final stop before heading northwest to explore Canada's third ocean – the Arctic Ocean – will be in St Johns, Newfoundland, next month. But this month our wheels touch down in historic Halifax, Nova Scotia.

ScanCan has only transited Halifax airport (en route for St Johns) so I have missed the many exciting sites of this maritime community. I promise to return and scan the airwaves along the shore and in the naval dockyards in a future column.

Monitoring Halifax International Airport

Table 1: Air Traffic Control

Radio: 122.5, 126.7
Automatic Terminal Advisory Service: 121.0, 229.1
Clearance Delivery: 123.95
Ground: 121.9, 275.8
Tower: 118.4, 236.6
Terminal: 119.2, 118.7, 225.2, 128.55, 363.8
Peripheral Station: Moncton Centre 119.2, 118.7, 128.55, 135.3, 225.2, 363.8

Table 2: Navigation Beacons

VHF Omnidirectional Range Test (VOT): 115.7
Instrument Landing System:
"JUG" - 109.9 (runway 24/06)
"IHZ" - 109.1 (runway 15/33)
VHF Omnidirectional Range/Distance Measuring Equipment:
"YHZ" - 115.1 (located at 44 55 23N; 63 30 47W)
Distance Measuring Equipment:
"IHZ" - 109.1 (located at 44 53 34N; 63 30 47W)

Scanning Cellular Frequencies - Legally

Scanning Canada came across a really interesting website recently. Mississauga, Ontario, resident Steve Punter is a computer software programmer by trade, but a cellular phone fan when he pulls himself away from his keyboard. Steve has been actively involved with his hobby of sleuthing cellular and PCS systems for the last fifteen years.

Canada has less rigorous legislation restricting monitoring of cellular telephone traffic than the United States. "Full 800 MHz coverage" scanners may be legally purchased at many radio stores in Canada (including at least one of MT's regular advertisers in the Toronto area). However, even unblocked scanners will only allow monitoring of analog telephone traffic. Now that most newer models of cellphones are digital, the number of conversations that can be heard is shrinking all the time. Scanning Canada does not promote the use of scanners to monitor cellular telephone traffic. ScanCan believes that private telephone conversations should remain just that – private.

Anyway, back to Steve Punter's excellent website. You can find it at <http://www.arcx.com/sites>. Steve is a very innovative UHF radio sleuth. He uses cellphones as fully legal cellular telephone band scanners. The website is called "Steve's Toronto Area Cellular/PCS Site Guide" and contains very detailed information about Canada's four major national cellphone providers, as well as reviews of several models of cellphones. What makes this website different, and appealing to Scanning Canada readers, is the radio monitoring techniques that Steve has used to pinpoint, identify and map cell sites in the Greater Toronto and Ottawa areas.

Steve's maps have been drawing visitors to his website since they were first put up on the web in late 1998. ScanCan used the maps to plot an "all-digital" rural route for driving to work. Here's a quote from the website to illustrate how Steve uses a cellphone as a UHF scanner to locate cell site transmitters:

"Back in 1989, I had my first cellular phone. This was a Radio Shack CT-100 in-car unit. This phone did not have a signal strength indicator, nor could it display command channels."

"One day I was over at Terminal 1 of Pearson Airport in Toronto and I noticed some rather fascinating antennas bolted to the side of the multi-level parking garage. I don't know why I thought they might be cellular, but this was my assumption. After getting home I started thinking about ways of proving if I had indeed found a site. After much head-scratching I came up with the idea of removing the antenna from the phone."

"Many of you are probably wondering what possible good that did, since unscrewing the antenna cable just results in the phone showing NO SVC. This is true, UNLESS you are within approximately 1/2 kilometer of a site. At that distance the signals from the site are so strong that they creep into the radio to be detected without an antenna."

"My next problem was determining which service the antennas belonged to. I solved that by changing the phone to 'Prefer Home System,' which would lock into my home service, but scan the alternate system if no signal was present. Now when I got close to a home system site, the NO SVC light went out, and the ROAM light stayed off. When I got close to a site of the alternate service, NO SVC light went out, and the ROAM light came on. Armed with this ability I could now drive around the city and know when I was getting close to a site."

Steve went on to explore the use of the "field debug" mode of cellphones to determine factors such as distance of the phone from a cellular transmitting site and even assisted manufacturers in troubleshooting problems with their phone sets. If you live in the Greater Toronto Area or Ottawa, go check out this website; it makes fascinating reading.

Air Shows in Jeopardy

ScanCan heard through MT contributor Jacques D'Avignon that the Ottawa International Air Show was in jeopardy due to skyrocketing insurance costs following September 11th. It was announced in mid-May that the Ottawa show would be held as planned, but the 400% increase in insurance costs could affect other air shows in Canada.



Soaring insurance costs threaten Canadian Air Shows.

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DJ-X10T	SCN 1	\$349.95
DJ-X2000T	SCN10	\$499.95

AOR

AR8200IIB	SCN 50	\$559.95
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YAESU

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ICOM

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R2	SCN 5	\$189.95**
R3	SCN 7	\$449.95**

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800 MHz base w/ right-angle conn.	ANT 23	\$34.95
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Scantenna + 50' coax	ANT 7	\$54.95*
Stealth Mobile Monitoring	ANT 30	\$34.95
H800 Skymatch Active	ANT 15	\$129.95*
Active Duck	ANT 36	\$39.95
Select-A-Tenna	ANT 21	\$59.95
Super Select-A-Tenna	ANT 40	\$189.95
AOR DA3000 Aerial Discone	ANT 11	\$129.00
AOR MA500 Wide Range	ANT 12	\$99.00
AOR SA7000 super-wide receiving	ANT 39	\$199.95
Range Extending Mobile Mag Mount	ANT 3	\$24.95
WiNRADiO AX-31B Active UHF Ant.	ANT 4	\$119.95
Grove Universal Telescoping Whip	ANT 6	\$19.95
Nil-Jon Super-M Superior Mobile Ant.	ANT 10	\$79.95
Create CLP51301N Log-Periodic Ant.	ANT 16	\$429.95
Create CLP51302N Log-Periodic An.	ANT 17	\$299.95
50' of RG-6U cable	CBL 50	\$19.95*
100' of RG-6U cable	CBL 100	\$24.95*

ACCESSORIES

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Scanner Master Reaction Tuner "SMARTLINK"	ACC 22	\$69.95
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BP120 spare battery & charger	BAT 24	\$25.95
BC235/245 hard leather case	CAS 3	\$29.95
DC cord	DCC 7	\$15.95
Uniden BP1200 Nickel Hydride Batt.	BAT 1	\$29.95
Scanner Master Winscan 780 Software	SFT 1	\$69.95
Scanner Master Winscan 245 & 895 Software	SFT 3	\$59.95

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EBP-34N Longlife NiCd battery	BAT 21	\$79.95
EBP-37N Standard battery	BAT 21A	\$39.95
EDH-16 battery case, 4 "AA"	BAT 22	\$9.95
DJ-X10T soft case	CAS 19	\$12.95
EDC-36 car lighter cable w/filter	DCC 14	\$23.95

AOR SCANNERS

Extended memory card for AR8200II	ACC 27	\$79.00
AR8200II leather case	CAS 21	\$24.95
AR8200II soft case	CAS 25	\$12.95
Tape recording lead for AR8200II	CBL 7	\$61.00
Computer control lead for AR8200II	CBL 8	\$109.00
AC adaptor for AR8200II	PWR 24	\$21.95
CTCSS squelch & search card	ACC 24	\$96.00
Tone eliminator (256 steps) card	ACC 25	\$58.00
Chip based recording & playback card	ACC 26	\$77.00
Computer Interface Cable for 8200	CBL 13	\$20.00

YAESU SCANNERS

VR-500 cloning software and cable	SFT 25	\$39.95
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ICOM SCANNERS

R3 battery pack	BAT 4	\$46.95
R2 soft case	CAS 20	\$29.95
R3 leather case	CAS 2	\$19.95
R3 Cigarette Adaptor	DCC 18	\$24.95
R3 drop-in charger	PWR 15	\$69.95
R2 CS-R2 cloning software	SFT 7	\$12.50
R3 software for Windows 95/98	SFT 14	\$19.95
OPC-478 Computer Interface (PC to radio)	ACC 3	\$44.95

MISCELLANEOUS ACCESSORIES

Universal Cigarette Adaptor	DCC 3	\$12.95
GRE Super Amplifier	PRE 1	\$49.95
Scantcat Gold for Windows	SFT 2W	\$99.95
Scantcat Gold for Windows SE Upgrade	SFT 2SE	\$59.95
Grove FTR-100 Scanner Filter 90-174MHz	FTR 100	\$49.95
PAR VHF Intermod Filter 152MHz	FTR 152	\$69.95
PAR VHF Intermod Filter 158MHz	FTR 158DS	\$69.95
PAR VHF Intermod Filter 462MHz	FTR 462DS	\$69.95
FM Trap Filter 88-108MHz	FTR-FMDS	\$69.95
Professional Mobile Speaker	SPK 1	\$19.95
Drake MS-8 External Speaker	SPK 2	\$48.95
PAR NOAA Weather Filter 162 MHz	FTR 162DS	\$69.95
Yaesu SP-8 Speaker	SPK 4	\$159.95

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HFDL Frequency Update

Two months ago, we noted that the airline communications system called High-Frequency Data Link (HFDL) could now be decoded by users of a free sound card program for Windows on the IBM-style Personal Computer (PC). This program is still available as a download, but now there is also a Version Two which is worth all of the US \$35 it costs.

This newer program will actually work right off, but only for ten minutes at a stretch until PC-HFDL author Charles Brain, G4GUO, gets his money and sends you a key. This also makes the manual accessible, and gets you one year's support.

This program is the most addictive thing since Space Invaders. On my third, or fourth, or fifth, or sixth ten-minute period, I struck gold. The San Francisco station, which always has a window-rattling signal here, broadcast a complete list of all the frequencies used by all 13 ground stations! Sure beat ferreting them all out by listening. The transmitted list appears at the end of this column.

I've since learned that this "system table" is pretty much the guts of the whole HFDL frequency database. Ground stations transmit the entire list every time there's a change, and all operating receivers within earshot update their databases of frequencies and data "slots." Until all the aircraft on the system have the new info, their radios can request it, meaning that ground stations will frequently transmit the information after a change.

PC-HFDL is receive only, of course, but it does something similar. The frequencies are automatically updated in a data file used by the program. At this point its display changes from rather cryptic channel numbers to the actual kilohertz (kHz) being used. This file can also be updated manually, though this is too advanced to discuss here.

Since the identifying/synchronizing "squitters" sent every 32 seconds contain working frequencies in current use by connected stations, we have instant info on where the other stations in range might actually be transmitting. Better yet, it's almost like having your own propagation sounder, since frequency choices reflect some pretty heavy-duty link optimization in real time.

Users of the high end decoders such as Hoka and Wavecom have had HFDL for quite a while, but it's new to this end of the price range. Most airplanes transmit their positions regularly, and weather observations are also common. This is

great stuff, and it may be the future for flight following by short wave.

The free Version 1 is available for download from the Ute World website above, among others; for the supported Version 2, go to <http://www.chbrain.dircon.co.uk/hfdl.html>.

◆ Weirdest "Numbers" Yet

News stories about the Middle East have everyone interested in the Israeli "numbers" broadcasts. These are the ones with the three-letter callups in standard military phonetics, as given by a weird, mechanical, female voice in French-accented English.

"First Wilco," an interesting folk-pop band which has recorded alone and with political rocker Billy Bragg, had a surprise hit with an edgy little album called Yankee Hotel Foxtrot. Yes, this phonetic is one of the Israeli callups, and the actual recorded voice is heard at the end of one of the songs. The real YHF has been logged on 2844, 3840, 4560, 5820, 7918, 9402, and 10648 kHz, usually amplitude modulation (AM).

Perhaps because of all the publicity, a fake Israeli transmission has been heard several evenings, U.S. time, on the newly popular "pirate radio" frequency of 6925 kHz. The voice uses weird phonetics, such as "Yeti" for Y. Sometimes unintelligible music follows. One message spelled out "Woodbury Park, you know who you are."

It's getting strange out there, folks.

Table 1: HFDL Frequencies

Broadcast by the San Francisco, CA, ground station on 11 May 02, and converted to kHz. The signal is single-tone, 8-step phase-shift keying, centered on 1440 hertz, with fallbacks to 4 or 2 steps. Symbol speed is 1800 baud, but effective data bit rates are 150, 300, 600, 1200, and 1800 bits per second depending on channel quality. Use upper sideband, and a filter width of 2.8 kHz.

Transmissions have a distinctive buzz lasting a few seconds. Actively connected stations will send network management "squitters" every 32 seconds.

Ground Station 1 San Francisco, CA

121 45 34 W 38 22 48 N
2947 4672 5508 6559 8927 10081 11327 13276 17919 21934

Ground Station 2 Molokai, HI

157 10 46 W 21 10 47 N

2878 2947 3001 3019 3434 5463 5508 5529 5538 6559 8912 8936 10081 11312 11348 13276 17919 17934 21928 21937

Ground Station 3 Reykjavik, Iceland

21 50 59 W 64 4 47 N
3116 3900 5720 6712 8977 11184 15025 17985

Ground Station 4 Riverhead, NY

72 38 22 W 40 52 47 N
3428 5523 6652 8912 11315 13276 17919 17934 21931 21934

Ground Station 5 Auckland, New Zealand

174 48 35 E 37 1 10 S
3016 3404 5583 6535 8921 10084 11327 13351 17916 21949

Ground Station 6 Hat Yai, Thailand

100 23 24 E 6 56 23 N
3470 4687 5655 6535 8825 10066 13270 17928 21949

Ground Station 7 Shannon, Ireland

8 55 46 W 52 43 48 N
2998 3455 5547 6532 8843 8942 10081 11384

Ground Station 8 Johannesburg, South Africa

28 12 35 E 26 7 46 S
3016 4681 8834 13321 21949

Ground Station 9 Barrow, AK

156 46 46 W 71 18 0 N
2944 2992 3007 3497 4654 4687 5529 5538 5544 6646 8927 8936 10027 10093 11354 17919 17934 21928 21937

10, Annapolis, MD, is a closed test station.

11 is not used.

Ground Station 13 Santa Cruz, Bolivia

63 7 46 W 17 40 11 S
2983 3467 4660 6628 8957 11318 13315 17916 21946 21973 21988 21997

Ground Station 14 Krasnoyarsk, Russia

92 18 0 E 56 6 0 N
2878 2905 10087 13321

Ground Station 15 Al Muharraq, Bahrain

50 39 0 E 26 16 12 N
2986 5544 8885 10075 11312 13354 17967 21982

Ground Station 16 Agana, Guam

144 48 0 E 13 28 11 N
8927 8936 11288 11306 13312 13339 17919

Abbreviations used in this column

AFB	Air Force Base
ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARQ	Automatic Repeat Request teleprinting system
AWACS	Airborne Warning and Control System
CAMSLANT	Communication Area Master Station, Atlantic
CW	Morse code telegraphy ("Continuous Wave")
DEA	Drug Enforcement Administration
DTMF	Dual Tone Multi-Frequency ("phone tones")
DX	Distant Transmitter
E10a	Israeli phonetic female, null message format
EAM	Emergency Action Message
FAX	Radiofacsimile
FEC	Forward Error Correction teleprinting system
GHFS	Global High-Frequency System
HFDL	High-Frequency Data Link (air digital system)
LDOC	Long Distance Operational Control
LSB	Lower Sideband
MARS	Military Affiliate Radio System
Meteo	Meteorological
M8	Cuban "cut" Morse numbers
MFA	Ministry of Foreign Affairs
MFSK	Multitone Frequency-Shift Keying
PACTOR	Packet Teleprinting Over Radio
PR	Puerto Rico
RSA	Republic of South Africa
RTTY	Radio Teletype
SITOR-A	Simplex Teleprinting Over Radio, ARQ mode
SITOR-B	Simplex Teleprinting Over Radio, FEC mode
UK	United Kingdom
Unid	Unidentified
US	United States
V2	Cuban Spanish female, says "Atencion!"

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations (encrypted, usually unidentified, broadcasts thought to be intelligence-related) are identified in () with their ENIGMA station designators, as issued by the European Numbers Intelligence Gathering and Monitoring Association.

- 490.0 G-Monsanto Radio, Portugal, with SITOR-B gale warning in Portuguese at 2100. (Day Watson-UK)
- 1039.0 CYP-UK military, with ALE sounding at 2012. (Watson-UK)
- 4153.0 Whiskey Mike-US military, in a tracking exercise with Golf Whiskey at 0245. (Ron Perron-MD).
- 4469.0 Florida CAP 60-US Civil Air Patrol, taking net check-ins at 0132. (Perron-MD)
- 4721.0 Team 35-US Air Force Reserve, in patch via Andrews to McGuire AFB, at 0218. (Perron-MD)
- 5219.3 CFH-Canadian Forces, Halifax, NS, with RTTY weather at 0116. (Bob Hall-RSA)
- 5399.6 "P-0-D"-Probably US Coast Guard Greater Antilles Section (GANTSEC), PR, radio checks with "K-3-V" at 0158. (Perron-MD)
- 5418.0 Cuban CW "cut numbers" (M8), at twice at 0200. (Camillo Castillo-Panama)
- 5450.0 Unid-Probably UK Royal Air Force, Drayton, aviation weather at 0440. (Barry Williams-AL)
- 5550.0 New York Radio-Air route net CAR-A (Caribbean) taking position from Continental 112, at 0245. (Perron-MD)
- 5696.0 Coast Guard Rescue 6013-US Coast Guard helicopter in a search, working CAMSLANT at 2101. (Allan Stern-FL)
- 5732.0 Panther-US DEA, working Juliet 03 at 2303. (Perron-MD)
- 5759.0 Cuban CW "cut numbers" (M8), at 0201. (Castillo-Panama)
- 5763.0 Cuban AM female "numbers" voice (V2), at 0205. (Castillo-Panama)
- 5881.9 Bucharest Meteo, Romania, with RTTY weather at 2048. (Ary Boender-Netherlands)
- 6496.4 CFH-Canadian Forces, Halifax, NS, RTTY weather, parallel on 4270.7, at 0257. (Hall-RSA)
- 6697.0 Owl Hoot-US military, came from 8992 and 11244 for EAM

- broadcast at 0444. (Jeff Haverlah-TX)
- 6712.0 Offutt-US Air Force GHFS, 6-character EAM at 0614. (Brent Davenport-CO)
- 6784.0 Cuban CW "cut numbers" (M8), at 1301. (Castillo-Panama)
- 6797.0 Cuban CW "cut numbers" (M8), at 1215. (Castillo-Panama)
- 6854.0 Cuban AM female "numbers" voice (V2), at 0301. (Castillo-Panama)
- 6912.0 CIOSE-Israeli intelligence "numbers" (E10), repeating this abnormal callup string for over 2 hours in AM, first heard at 0025. (Williams-AL) *[This and other "SE" suffixed broadcasts came at the same time that news media reported postponement of an imminent offensive in Gaza. -Hugh]*
- 6915.0 CNPC3-Romanian military, Cluj Nopoca, working BU3C3, Bucharest, in ALE and then data, at 2232 and 2241. (Watson-UK)
- 6930.0 VLBSE-Israeli "numbers" (E10), abnormal callup repeated for at least 2 hours, first heard at 0032. (Williams-AL)
- 6931.0 Cuban CW "cut numbers" (M8), at 1305. (Castillo-Panama)
- 6961.0 Cougar 1-Unknown, working US Coast Guard 1712, a C-130 also identifying as Herk 12, clear and secure at 0036 (Mid-Atlantic DXer-MD)
- 6981.0 Cuban CW "cut numbers" (M8), at 1308. (Castillo-Panama)
- 7450.0 59B-Control station of self-identified LSB "Arizona Emergency Training Net, authorized by the Arizona National Guard," calling any "Broadway Consumer" stations. Checked in B.C. 70B, 57ZFD, and 57C, then had a long, rambling ragchew, at 1520. (Hugh Stegman-CA)
- 7646.0 DDH7-German weather service, with RTTY weather at 1900. (Patrice Privat-France)
- 7914.0 AFA2DB-US Air Force Mars, Region 2, VA, working AFA2QG in 16-tone MFSK, at 2330. (MADX-MD)
- 8237.0 Unid-Station repeating "0123" in DTMF tones, at 1949. (Boender-Netherlands)
- 8429.5 IDR4-Italian Navy, Rome, with RTTY channel bulletin and occasional operator chatter, at 0948. (Watson-UK)
- 8737.0 5BA42-Cyprus Radio, with voice loop marker, at 2016. (Boender-Netherlands)
- 8837.0 Unid-Female working an El Al flight in Hebrew, probable LDOC, at 2256. (Perron-MD)
- 8912.0 Omaha 370-US Customs Service, probably a P-3, clear and secure at 0020. (Perron-MD)
- 8942.0 AY9962-Finnair flight, position for Shannon in HFDL, at 1132. (Privat-France)
- 8971.0 Fiddle-US Navy, Jacksonville, FL, working Card File, a P-3, at 1419. (Stern-FL)
- 8977.0 Yeovil Ops-UK military, radio check with "2-T-P" at 0730. (Boender-Netherlands)
- 8980.0 Coast Guard Rescue 2118-US Coast Guard aircraft working CAMSLANT in a search operation at 0106. (Perron-MD) Cougar 1, calling Coast Guard 1712, at 0153. (MADX-MD) Coast Guard Rescue 2133, working CAMSLANT on a search at 1415. (Stern-FL)
- 8983.0 CAMSLANT Chesapeake-US Coast Guard, VA, working CG Rescue 1706, a C-130 over a boatload of Cubans, at 0205. Coast Guard Rescue 1701, C-130 reporting debris in the water to CAMSLANT in the search for a missing F-15, at 1425. (Stern-FL)
- 8992.0 Razz 08-Probably US Navy, calling Mainsail (any ground station), no joy, at 1447. (Haverlah-TX) Navy LL 58-US Navy P-3, patching Lajes Duty Office at 2315. (Perron-MD)
- 9016.0 Knowledge-US military, with a 28-character EAM simulcast on 8992 and 11244, at 2300. (Haverlah-TX)
- 9050.0 PAR-French military/ Rockwell-Collins, Paris, ALE sounding at 1703 and 1748. (Watson-UK)
- 9057.0 Annually-US military, with a 28-character EAM, simulcast on 8992 and 11244, at 1500. (Haverlah-TX)
- 9964.7 FDI22-French Air Force, Narbonne, with RTTY test loop at 1845. (Watson-UK)
- 9996.0 RWM-Russian time station, Moscow, CW pip every second, at 1848. (Watson-UK) *[Makes nice heterodynes with WWW. -Hugh]*
- 10100.8 DDK9-Hamburg Meteo, Germany, RTTY weather at 1230. (Privat-France)
- 10193.0 DHJ-59-German Navy, working vessels in voice and RTTY, at

0027. (Perron-MD)
- 10204.0 Service Center-US Customs Service, working 3SK in ALE-initiated clear and secure voice at 2300. (Perron-MD) Castanet-US military, with 28-character EAM simulcast on 8992 and 11244, at 2305. (Haverlah-TX)
- 10206.0 DHJ-58-German Navy, Glucksburg, working vessel in voice and RTTY, at 0050. (Perron-MD)
- 10360.0 0004444-Turkish military, ALE sounding at 2151. (Watson-UK)
- 10392.0 KUW-UK military, Kuwait, ALE sounding at 2905 and 2055. (Watson-UK)
- 10658.0 2020-Turkish Red Crescent, ALE sounding at 2023. (Watson-UK)
- 10780.0 Cape Radio-US Air Force, working several downrange units in a scrubbed Space Shuttle launch, at 0805. (Stern-FL)
- 11000.0 RIW-CIS Navy, Khiva, Uzbek, working vessel RMZW in CW, at 1524. (Watson-UK)
- 11039.0 DDH9-Hamburg Meteo, Germany, RTTY marker giving frequencies as "147.3 kHz 11039 kHz 14467.3 kHz," then weather in German, at 2129. (Watson-UK)
- 11080.0 YKP28-Syrian Arab News Agency, Damascus, with RTTY news broadcast in Arabic, at 1533. (Watson-UK)
- 11125.0 HZN-Jeddah Meteo, Saudi Arabia, with RTTY weather at 2000. (Privat-France)
- 11165.0 Unid-Two stations chattering in Korean or Japanese, one of them singing, at 2140. (Williams-AL)
- 11175.0 Reach DX3-US Air Force, with a patch via Thule to Air Transport International in Little Rock, AR, at 0615. (Davenport-CO) Andrews-US Air Force GHFS master control station, MD, announcing that they were "declaring an internal emergency and evacuating the facility," at 1445. Station back up with EAM at 1505. (Larry Van Horn-NC) [Day of the big MD tornadoes. -Hugh] Cody 01-US Air Force Reserve, in a patch via Andrews GHFS to Gunrunner (Robins AFB), at 2017. Horse 903, patch to Little Rock via Andrews, at 2039. Reach 6136-US Air Force transport, with a patch via Offutt, declaring maintenance Alpha-2 for a bad engine, at 2115. Army 70049-US Army aircraft, working Andy at 2326. (Stern-FL)
- 11181.0 Gloomig-US military, with two EAMs, simulcast on 8992 and 11244, at 1615. (Haverlah-TX)
- 11205.0 Smasher-US Air Force, Key West, FL, calling unknown aircraft Shark 45, at 0957. (Perron-MD)
- 11226.0 Sentry 61-US Air Force AWACS, working Raymond 24, Tinker AFB, at 2255. (Perron-MD)
- 11232.0 Bandsaw Lima-US Air Force AWACS, in a patch to Tinker AFB via Trenton Military, at 1625. (Stern-FL)
- 11244.0 Puerto Rico-US Air Force GHFS, Salinas, PR, with a 28-character EAM simulcast on 4724, 6739, and 8992, at 0620. (Davenport-CO)
- 11300.0 Tripoli-Air route control for AFI-3 net (Africa/Indian Ocean), working aircraft at 2150. (Williams-AL)
- 11318.0 Unid-Female with flight weather in Russian, possibly Syktyvkar, at 0235. (Perron-MD)
- 11494.0 Panther-DEA, Bahamas, working helicopter Juliet 03, also ALE, at 2042. (Perron-MD)
- 11523.0 KUW-UK military, Kuwait, ALE sounding at 2212. (Watson-UK)
- 12127.5 NNN0MDE-US Navy-Marine Corps MARS e-mail system for US Coast Guard, announcing PACTOR-II messages for several vessels, at 0002. (MADX-MD)
- 12587.0 LZW-Varna Radio, Bulgaria, with SITOR-B maritime news broadcast in Bulgarian, at 1020. (Watson-UK)
- 13155.0 Gun Barrel-US military, testing on a remote transmitter with distinct circuit noise, then 3 differently configured broadcasts of the same 28-character EAM, at 1506, 1509, and 1510. (Haverlah-TX)
- 13242.0 Crazy Weed-US military, with a 28-character EAM simulcast on 8992 and 11244, at 1540. (Haverlah-TX)
- 13243.0 Aircraft 8151-Unknown, calling MacDill Airways at 1824. (Haverlah-TX) [Wrong station, wrong call, wrong frequency. They'll chuck all the old manuals someday. -Hugh]
- 13318.0 Speedbird 1713-British Airways, calling ground station with no joy, at 1013. (Perron-MD)
- 13907.0 Panther-DEA, Bahamas, working helicopter Juliet 03 at 2308. (Perron-MD)
- 13927.0 AFA3BB-US Air Force MARS, handling morale patch for aircraft Longhorn 27 over FL, at 2155. (Stern-FL)
- 14560.0 116-Chinese MFA, working 123 in ALE, then data exchange at 1407. (Watson-UK)
- 14812.0 BRA-MFA, Bratislava, Slovakia, working BGD, Baghdad in ALE, then digital, at 0924. (Watson-UK)
- 15016.0 Offutt-US Air Force GHFS, NE, with a 28-character EAM at 1858. (Haverlah-TX)
- 15867.0 Juliet 03-Unknown helicopter in patch via Panther to Service Center (US Customs, OK), then radio check with Coast Guard District 7 (Miami, FL), at 2131. (Perron-MD)
- 16241.7 KDAKRFR-Egyptian MFA, Cairo, with daily high-power Arabic ARQ broadcast to all stations, at 1530. (Hall-RSA)
- 16606.0 Unid-UK military, Cyprus, in 4-tone MFSK, at 1630. (Hall-RSA)
- 16979.9 PWZ33-Brazilian Navy Rio de Janeiro, FAX chart at 1750. (Watson-UK)
- 17069.6 JJC-Tokyo Radio, with a Japanese text FAX labeled "Navigational Warnings," at 1627. (Watson-UK)
- 17180.0 FUG-French Navy, La Regine, working vessel "FT," in RTTY at 1216. (Watson-UK)
- 17239.7 PKX-Jakarta, Indonesia, with a CW marker at 1318. (Watson-UK)
- 17973.0 Favorable-US military, with an EAM at 2054. (Haverlah-TX)
- 18270.0 BRA-MFA, Bratislava, Slovakia, ALE sounding at 1147 and 1246. (Watson-UK)
- 18320.0 BRA-MFA, Bratislava, Slovakia, ALE sounding at 1100 and 1155. (Watson-UK)
- 18594.0 TST-US Customs Service, ALE sounding at 1750 and 1835. CS1, sounding at 1811. DO7, sounding at 1830. (Watson-UK) Panther-DEA Bahamas, patching Juliet 03 to Service Center, who advises they contact Delta 07, at 2245. (Perron-MD)
- 19131.0 Atlas-DEA, IA, working Coast Guard 33C at 1924. (Perron-MD)
- 19665.0 Hard Wood-US Military, very long EAM simulcast on 6697, 8992, and 11244, at 0347. (Haverlah-TX)
- 20048.1 "S"-Russian Navy, Arkhangelsk, CW single-letter channel marker at 1022. (Watson-UK)
- 20469.0 AXM-Melbourne Meteo, Australia, with FAX weather at 1950. (Privat-France)
- 20602.0 PRI-UK military, Pristina, Yugoslavia, sounding in ALE at 1243 and 1622. CYP, sounding at 1310 and 1646. (Watson-UK)
- 20631.0 NST-Possible US Air Force, sounding in ALE at 1423 and 1436. (Watson-UK)
- 20698.0 S53-Swedish Embassy, Amman, Jordan, calling S00, Stockholm, Sweden, in ALE at 1045. S53, sounding at 1340. (Watson-UK)
- 20890.0 CS9-US Customs Service, many ALE sounds beginning at 1236. DO7, sounding at 1347 and 1539. PR1, sounding at 1352 and 1654. CS5, sounding at 1540. (Watson-UK) Service Center-US Customs, making ALE-initiated voice radio checks with Coast Guard Group, Key West, at 2020. (Perron-MD)
- 20900.0 KAH- Slovakian Embassy, Cairo, Egypt, sounding in ALE at 1348 and 1602. (Watson-UK)
- 20942.0 S97-Swedish Embassy, Abidjan, Cote d'Ivoire, ALE sounding at 1654. (Watson-UK)
- 20958.0 S84-Swedish Embassy, Washington, DC, calling S94, Guatemala City, in ALE at 1414. (Watson-UK)
- 20963.5 LCR154-Polish military, calling ETD165 in ALE, then short voice contact at 1326. (Watson-UK)
- 20990.0 BGD-Slovakian Embassy, Baghdad, Iraq, ALE soundings at 0832 and 0856. (Watson-UK)
- 22387.5 SVO-Olympic Radio, Greece, with SITOR-B news for ships in Greek, at 1304. (Watson-UK)
- 22540.0 ZSC-Cape Town Radio, RSA, ARQ marker on new frequency, at 1220. (Hall-RSA)
- 22603.5 UIW- Kaliningrad Radio, with Russian text RTTY message at 1615. (Hall-RSA)
- 22857.7 RFVI-French Navy, Le Port, with ARQ message for Noumea, New Caledonia, at 1234. (Hall-RSA)
- 24757.0 Unid-Italian Diplomatic, Rome, probably working Lagos, Nigeria, in ARQ at 1235. (Hall-RSA)
- 26241.7 RFVI-French Forces, Le Port, with ARQ at 1559. (Watson-UK)

HF Decoding

This month, I had promised a more in-depth look at ARINC's HF DataLink system, made possible through the recent release of the PC-HFDL software package. However, since it's been well covered in the *Utility World* and *Plane Talk* columns, here's a look instead at **HFDencoding.com**.

As we had written in our recent review of the 2002 *Klingenfuss Utility Guide*, we found the database to be wanting in a number of departments. We found this to be particularly so with the newer but nevertheless common systems often covered in this column.

A new entry may possibly fill the gap: HFDencoding.com. This CD and web-browser-based service will launch by the end of May and should now be commercially available. Thanks to the folks at HFD, we were allowed a few days of unrestricted access to the beta version of the database, and it looks at a first glance to show some promise. Here's what we found (including some replies from the HFD to my feed-back).

HFD exists in two forms:

1. An on-line subscription-based service accessed through your favorite browser;
2. A CD-ROM which you can update by mail or through the on-line service.

These two basic services can be used standalone or in combination. Subscribers to the CD will be emailed a monthly batch of updates sent as a Microsoft Access database or as an XML (Extensible Markup Language) file that most databases, radio control, and spreadsheet programs understand.

We concentrated on the on-line version of the service for our review.

First of all, HFD boasts a huge database covering from 5 kHz to 30 MHz, as the statistics show:

- over half a million entries, of which 150,000 are unique users
- strictly utility transmissions (no broadcasting)
- 21,000 SITOR/PacTOR/Packet selcalls, ALE identifiers and other callsigns
- 16,000 ICAO (airport) and WMF (meteorological) stations

The contents are fresh, too, updated daily and constantly fed by a network of professional and semi-professional monitors. We tested this claim by searching the database for some very recent ALE activity and a new Chinese modem, and we found all but one entry already in the system. Impressive! In fact, demanding users (we're guessing that a few government agencies might fall into that category) can opt for daily updates to their CD.

The database is formatted to contain just about anything you might need to know about the activity of any given station of interest as figure 1 shows: frequency, on and off times or schedule, callsign, user and location, digital system, system parameters (baud rate, tone shift, modem structure etc), QSX and QSW (send and receive) frequencies.

Frequency	Modulation	Spd/Shift	ACF	Control	Callsign/Comments	Schedule
6730.000 USB				FAF Villacoublay		24h
6730.000 USB MH-9-9-141A ALE		125/1750	43	Sonatrach Algiers	RTI:MAN	24h
6730.000 USB				Nicaragua		0000-0100
6730.400 CW		300/200		Unid C. Europe		0500-1000
6711.000 USB Starag205 modem		2400/2000	32	Nao		0100-1000
6711.700 Aeq		100/170	45	MFA Cairo	Rome	1745-2215
6712.000 USB MH-9-9-110A1 modem		2400/5000	20	USAF Goughan		24h
6712.000 USB				FAF	Marjaine2	24h
6712.000 Dup-Aeq		125/170	88	MFA Budapest		24h
6712.000 USB				PLA 4F	012	0030-0100
6712.000 USB MH-9-9-141A ALE		125/1750	43	Unid	LJ11,M011,S111	24h

Figure 1: Database sample

However, during our test, we found that only the frequency, user and system were displayed after a search. This may be rectified in the full release version of the on-line service.

Searching, Searching...

Conducting a search on HFD is very simple indeed. Just enter a frequency or keyword into a single box and the database does the hard work. We liked the fact that the database is intelligent enough to distinguish between frequency and text searches. Indeed, HFD staff told us that they are also working on an improvement to the current scheme to allow "a plain English question" to be entered instead.

We also appreciated that a frequency-based search shows results +/- 10kHz from the entered frequency and also highlights in red a "direct hit." When entering a search frequency, the database does everything by kilohertz, alleviating the need for entering "k"s, "MHz" or decimal points. We'd like to see the +/- factor customizable from perhaps 10 kHz to 500 kHz, even though this puts an inevitable strain on servers and download times if your connection to the internet is slow. HFD told us that a "frequency span" option would be added to the release version of the database search page.

After you have your initial list of results, you can simply click on an entry to see the details. Figure 2 shows an example detailed view.

We'd like to see some ability to further examine this detailed view, however. It would be useful to link directly to the QSX frequencies, see a system description or hear an audio clip, for example. These are all obvious things made possible by the web format. HFD told us that these improvements are also being worked on.

We found the searches to be fast—regardless of whether we used regular 56k dial-up access or

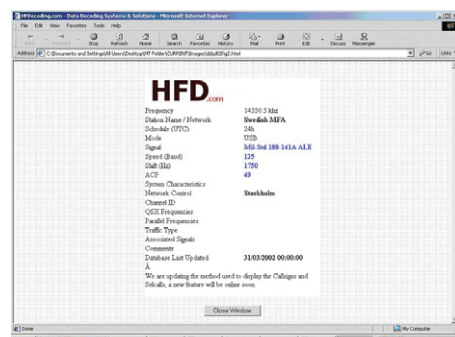


Figure 2: Detailed Database Record

a 500k DSL modem. Likewise, we experienced no problems accessing the web-based service using Microsoft's Internet Explorer or Mozilla (a free Netscape clone) on both PC (Windows 98) and Macintosh (OS9 and OSX) computers.

Although the simple one-box search is really quick and easy and will probably suffice for many applications, we inevitably see a need for something more complex. For this we'd like to see HFD add an "advanced search" facility allowing users to perform searches such as "all Chinese embassies using MIL-188-110A modems between 17000 and 17400 kHz." This, of course, is likely to be possible should HFD implement the "plain English" search that we noted earlier.

Overall Verdict

Pro

- massive, highly accurate, utility-only database
- on-line and CD
- daily updates
- fast and easy to use

Con

- utility only
- some rough edges still need to be ironed out
- could be cheaper

So how much will the service cost? The HFD staff tell us they are expecting to charge \$150 (or 175 Euro) for a CD plus one year's access to the on-line service and updates. It is likely that a menu pricing scheme will be used for other more limited options, such as the purely web-based access used for this review.

In summary, we think that HFD compares favorably with competing offerings (Klingenfuss, Frequency Manager, Shoc etc), given the advantages of immediate access to fresh data and complete utility focus.

Check HFD out at <http://www.hfdencoding.com>. That's it for this month. Have fun with the digital utes.

Shortwave Preacher Arrested for Sexual Misconduct

Allan Weiner reported on his WBCQ program that "Brother" R.G. Stair was arrested by South Carolina authorities on suspicion of sexual misconduct. Al Patrick reports that the basis for this seems to be allegations made by several former associates from his Walterboro, SC, religious commune, posted at <http://www.thenetteam.net>. Stories about this broke May 17 in the local weekly, *Walterboro Press & Standard*, not online; images of it were posted temporarily at above site. Then AP picked up the story:

MINISTRY LEADER ARRESTED ON SEX CHARGES

Saturday, May 18, 2002, Associated Press

WALTERBORO — A Canadys man who leads a group called The Overcomer Ministry has been charged with two counts of second-degree criminal sexual conduct, the State Law Enforcement Division said Friday. Ralph Gordon Stair, 69, was denied bond and was being held in the Colleton County jail, SLED spokeswoman Kathryn Richardson said.

...Arrest warrants say Stair "used coercion to accomplish this battery by enforcing his religious/personal beliefs with the victim." ...Stair also was charged with two counts of breach of trust, Richardson said. Warrants said Stair took \$26,556 on Sept. 7, 2000, then \$3,079 a week later from a man's retirement investments (AP)

Anita McCormick found a story about this on the WIS-TV Columbia website, which added: "Stair's been a religious leader for 30 years, and has compounds at several places throughout the country. Former Overcomers say he cycles people in and out of those complexes, and allegedly takes members' money and abuses women, while forcing them to live in squalor."

In a quiet rural setting, a religious community of about 100 people at any given time has remained relatively hidden for decades. Now, former Overcomers are coming forward with allegations against Brother Stair. Stair has been preaching his own form of the Christian religion for over thirty years, on regular radio, television shows, and through his website.

Kathleen and Tom Duval left one year ago, after many years inside the secluded community. Kathleen says she gave hundreds of thousands of dollars to Brother Stair. That's all gone and she says she's considering filing suit.

Meantime, two other former Overcomers allege Stair forced them to have sex with him. Stair is in jail on two counts of criminal sexual conduct second degree, and two counts of breach of trust over \$1,000. (From story by Crystal Davis, posted by Sarah Gregory)

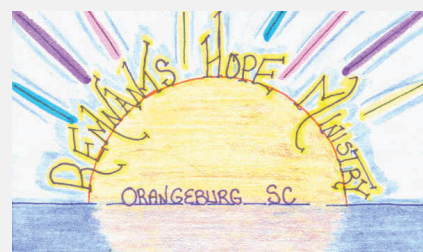
The Overcomer Ministry website itself posted newspaper stories about Stair's arrest: <http://www.overcomerministry.com/accused.htm>

Stair had vanished from WBCQ, but still appeared on the WRMI web schedule, though the transmitter was unheard. His full-time use of a WCCR transmitter continued, 1300-2200 UTC 9475 kHz, 2200-0400 7465, 0400-1300 7560. The Overcomer site showed just WCCR, WRMI and Juelich; no times on WBCQ or WINB, though direct links to those stations' websites were still showing.

Another site of disillusioned former followers is Remnants of Hope Ministry: <http://home.bellsouth.net/personalpages/pwp-remnantshope> Tom Read, BDXC-UK, notes that the Remnants Hope QSL card, completely hand-drawn, is on view in the USA section of his website: <http://www.qsl.net/ml1ey>

Remnants Hope Ministry

"The Remnants Hope Ministry is something that God put on my heart to do after he delivered my family and myself from the hands of R.G. Stair, the False Prophet from Walterboro, SC. The Lord told me to get on short-wave radio and to preach the truth and to do it with the right spirit... We stayed in the Orangeburg, SC, area so we could help anyone who might want to leave that place. It is my hope that this web site will be a blessing to you and that you will glorify our father which is in heaven, who is blessed for ever and ever. Amen With Love, Pastor Tim Butler"



Remnants Hope Broadcast: WWRB, Mon and Tue 2200-2300 UT 12172, 6890 kHz; 5085 & 6890 UT Sat 0000-0100 5085, 6890. Deutsche Telekom Sat and Sun 1200-1300 UT 6110 kHz; Sat 0800-0900 13810. Maranatha Net: Saturday 2000-2300 UT 14327 kHz; Sun 2000-2300 7233. E-Mail Group: Remnants_Hope-subscribe@yahooogroup.com

Remnants also refers to allied preachers: "These broadcasts tell the truth about R.G. Stair. ... For this cause and the warning of the people of God we have put all differences aside and seek to save those who are ready to perish by being deceived by R.G. Stair": Mike Rowland, UT Thu 0100-0200 7415. Pastor Dan Catlin, UT Mon 0100-0200 9330. *Table of Truth*, Mon 2300-2400 7415; UT Fri 0100-0200 7415; UT Fri 2330-2400 12172, 6890.

AFGHANISTAN [and non] USAID is installing a VSAT satellite system at Radio-Television Afghanistan in Kabul, to send the Radio Kabul signal via satellite to shortwave transmitters in Norway and somewhere in the Gulf. The programs will then be rebroadcast back into Afghanistan (Martin Hadlow, UNESCO, Kabul, via Paul Ormandy, New Zealand) I would think the given downlink destinations actually indicates a planned use of the Merlin-brokered Kvitsøy/Sveio and Al-Dhabbaya stations (Kai Ludwig, Germany, *DX Listening Digest*) From May 13, R. Voice of Afghanistan, 1330-1430, replaced Moldova 15480 with Austria 17870 (Wolf Harranth, ROI Intermedia via Wolfgang Buschel) Also RVOA tested from Kvitsøy, Norway 17525 and 18920 (BC-DX) Booming in on new 17870 via Moosbrunn, Austria, Dari/Pashto 1330-1430. Also heard on // 15480 via Moldova, but at much weaker level (Matt Francis, Australia, *DX Listening Digest*) 17870 is 500 kW, 90 degrees (Ivo and Angell Observer, Bulgaria)

ANGOLA [non] R. Ecclesia ceased transmissions

in Portuguese to Africa via Germany, 0500-0600 on 15545, 1800-1900 (Sat 2130) 13810 (Ivo and Angell Observer, Bulgaria, mid-May) Hardly unexpected, once they had the more convenient South African relay, but makes it much harder to hear abroad (gh)

ANTARCTICA Best chance of hearing LRA36, 15475.54 is when they stay on late past 2100, which happens unpredictably. Heard one day from 2030 with Argentine music, Spanish announcements until carrier off at 2201 with no closing ID. Signal improved steadily after 2100, reaching 34443 with slight het. S/off times other days 2058 and 2119 (John Cobb, GA, *DX Listening Digest*)

ARGENTINA RAE's new schedule valid until Nov. 1 resumes Italian and bumps English an hour earlier to Europe at 1800 M-F on 15345, 9690; also has started micro-program in aboriginal languages [what-ever that means - Guarani, Aymara, Quechua?], at times unspecified within Spanish M-F at 1200-1400 on 15345, 2300-2400 on 6060, 11710, 15345 (via

*All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2x freq = 2nd harmonic; A-02=summer season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated*

Gabriel Iván Barrera, RAE, *Conexión Digital*)

R. Maranhã, 6215, as early as 2145 in Portuguese; believe it is an unofficial station (Samuel Cássio Martins, São Carlos, SP, *DX Listening Digest*) 6215.08, at 0121-0223, Portuguese and Spanish, religious program, phone in from Paraguay, Brazil and Argentina, ID "Maranhã AM 1610" (Nicolás Eramo, Argentina, *DXLD*) Address: Calle Obispo Angelelli y María del Iguazú B, Industrial - 3370 Puerto Iguazú - Provincia de Misiones - Argentina. Tel. 54-3757 - 422713. Proprietario - Pastor Hugo Heidenger. 73's (Jan-Erik Österholm, Finland, *hard-core-dx* and Nicolas Eramo, *Conexión Digital*) Website does not mention SW: <http://www.sembrandovida.org.ar> (Arnaldo Slaen, Argentina) Samuel Cassio's recording of this is on WOR 1131; check archive (gh) On 6214.97, IDs differ depending on language, band: in Spanish it's R. Maranhã on AM, Cultura on FM; in Portuguese, R. Baluarte on AM, Futuro on FM. 96% of programming is in Portuguese (Gabriel Iván Barrera, Argentina, *Conexión Digital*)

AUSTRALIA Tho not expected on air before yearend, the new HCJB 100 kW facility at Kununurra WA, has already registered a schedule for A-02, with azimuths:

11755 0700-1130 132
15425 1130-1830 298
17560 0700-1130 132
17580 1130-1830 298
17750 1130-1830 298

(BC-DX) Note that some of these frequencies have previously been used by other Australian outlets, notably 15425 by VLV/VLX in Perth (gh)

BOLIVIA 6537.3v, La Voz del Campesino, Sipe Sipe, Departamento de Cochabamba at 0728-0758 "Abriendo Caminos". 0758 ID (Arnaldo Slaen, *Conexión Digital*)

BRAZIL Rádio Cultura, São Paulo, 17815 reactivated, at 1333, QRM from Romania in Arabic (Célio Romais, @*atividade DX*) ZYE961, around 2300, Brazilian music on 17814.93, blocked by Romania at 2358. Also on 9615 \\ 17815 at 0020, the latter buried under co-channel Romania (John Cobb, GA, *DX Listening Digest*)

Rádio Canção Nova wrote in English that they have a mailbag program for overseas listeners, *Além Fronteiras* (Beyond Boundaries) every Sat 2200-2300 on 1020, 4825, 6105 and 9675. And see <http://www.cancaonova.com> (Eduardo de Moura, PY2TP, Canção Nova via Pete Costello)

R. Nacional da Amazônia reactivated 11780 in May, according to RadioBrás president Carlos de Cerqueira Leite Zarur, to reach listeners in the north and northeast of Brazil, and beyond. RNA receives 85,000 letters per year. The station serves the interests of Brazil's most humble people with basic info on medical subjects such as pregnancy, contraception, illnesses and emergency aid (Teresa Cristina, Agência Câmara, <http://www.camara.gov.br> via Célio Romais, @*atividade DX*) 11780 heard here announcing tests at 1200-1900, and would be back in the morning on 31m, no frequency given, but said was also using 6180 continuously (Romais) Used to be powerhouse in NAM too, on 11780, favored for its music (gh)

Rádio Gazeta AM, São Paulo, 9685, of the Fundação Cáser Libero, enters into a new phase. Since 6 May its programming is developed and presented exclusively by students of the College of Communication Cáser Libero. Since 1995, the radio was leased to two religious groups. In this new phase, the broadcaster is on air 24 hours per day. The programming is based on journalism and much music, and has news, always one hour duration, at 7h, 12h, 18h and 23h [presumably local time]. In addition, "pills of information" along the day, with varieties, sports, economy and theater, and interviews. The coordinators are Peter Vaz and Sérgio Rizzo, professors of the college, with supervision of the superintendent of Radios of the foundation, Beto Rivera (A *Telefonia Virtual* <http://www.telefonia-virtual.com/> via Pentti Lintuärvä, *hard-core-dx*) on 5955, 9685 and 15325 (Célio Romais, @*atividade DX*) Also heard distorted 10365-10470 (Sarmento Campos, Rio de Janeiro, *radioescutas*) Maybe mix with their MW frequency? (gh)

Rádio Mundial AM, São Paulo is on 3325, heard at 0259*. On 4975 is the programming of Rádio Mundial FM (Célio Romais, Brasil, @*atividade DX*)

R. São Luiz, São Luiz Gonzaga, RS, at 1520-2206, on 18020, 17th harmonic of 1060 MW, Portuguese. 1600-1700 program: "Rio Grande Canta e Saudade", with sertaneja music; full ID at 1700, then "Domingo Alegre", and 1800-1900 "Descubendo Calor", including ads and sertaneja music too. From 1900 ballads and romantic music only. First heard by Arnaldo Slaen at 1840 (Marcelo Cornachioni, Argentina, *DSWCI DX Window*) When harmonics get that high, we need to be open to other possible explanations. Have there been any signs of any lower harmonics from this? (gh)

R. Clube Varginha, MG is presumably the reactivated signal on 3245 I ran into at 2247 with the compulsory *Voz do Brasil* program; 2300 switched to relay of Rádio Transamérica (Rik van Riel, Curitiba, Brasil, *BDXC*)

BURKINA FASO At the Las Vegas NAB convention I stopped by the RIZ Transmitters Booth [HQ: Zagreb, Croatia], asked if they had any current model 100 kW short wave transmitters in the field. They have one now in Burkina Faso; a picture of this in their display. This is probably the source of the 5030 transmission (Donald Wilson, *DX Listening Digest*)

BURMA [non] Democratic Voice of Burma approached RNZI last November about using its transmitter when not otherwise needed. Tests were undertaken in Dec and Jan, and DVB arranged for monitoring in Burma. They were satisfied, so on Fri 15 March, Rangitaiki began regular transmissions at 1430-1530 on 15620. Originates from DVB studios in Oslo. Later in year may have to change to a lower frequency. RNZI has no editorial control over contents, just leasing the transmitter (Adrian Sainsbury, RNZI Mailbox)

CANADA RCI-Sackville, at 0100-0200 on 15170 has spurs 135 kHz above and below, on 15305 and 15035, the latter QRMing RFPI (Steven Zimmerman, WI, *DX Listening Digest*) Actually 15305 is not a spur but mixes with 15170 to produce 15035; maybe also 15440 (gh)

CHINA [and non] VOA changed 1230-1300 Uzbek frequency via Sri Lanka from 19000 to 19015. The next day, CNR1 Chinese jamming followed it (Vladimir Kovalenko, Toms, Russia) Guess Uzbek is understandable in parts of China, similar to other Turkic languages.

Complete Chinese frequency list can be found at my website [http://](http://www.x-net.idv.tw/miller/cn-c.htm)

www.x-net.idv.tw/miller/cn-c.htm All times are in Taiwan/China times, UT +8 (Miller Liu, Taiwan, *DX Listening Digest*)

COLOMBIA Thanks to a tip from Omar Alberto Cabrera, operator of R. Nueva Juventud, Pasto, 5588.2, I heard his hobby station one Saturday evening. He planned to be on the air every UT Sunday 0200-0500 and is interested in DX reports to Carrera 1 No. 21-36, Pasto, Nariño, Colombia (Rafael O. Rodríguez R., Santa Fé de Bogotá, Colombia, *Conexión Digital*)

CONGO DR R. Lubumbashi heard on new 7435 from 1500 to 2105* alternating French and vernaculars (Mahendra Vaghjee, Mauritius, *hard-core-dx*)

CUBA This year's RHC essay contest topic is: what do you know about the Havana Club Rum Museum? First two prizes are week-long trips to Cuba, deadline Dec 31 (RHC via *Noticias DX*) See also VENEZUELA

ECUADOR R. Cosmopolita, Quito, and R. Sembrador/Chimborazo 98.1, Riobamba, are both heard on new 5900.00 USB, in Quichua around 0030; another night on 5905.00 USB instead, but next back on 5900.00 – the frequencies are absolutely exact. On the phone, technical chief Alejandro Yautibug told me this is a link between the Quito station on 960 and Riobamba on 98.1, and a third was soon to be added, R. Filadelfia, Guayaquil, 1170. The two USB transmitters are about 200 watts. Most exciting is their application to start "real" SW-transmissions in AM with considerably higher power, to reach a greater part of the Indian population. The frequency will be somewhere around 4000-4015. It is very hard for the Indian population to start new transmitters here (Björn Malm, Quito, Ecuador, *SW Bulletin*, translated by editor Thomas Nilsson for *DX Listening Digest*)

HCJB's Spanish service on 15140 surprisingly heard in slow English at 2350 on a Tuesday, *Spotlight*, with website <http://www.radio.english.net> At 2359 back into Spanish without comment. Forwarded to rough-looking <http://specialized.english.net/> – another way of promoting Christianity, with a limited vocabulary. Also 15140 Sunday at 2235 *Aventura Diexista*, familiar voice of Allen Graham, speaking Spanish (Glenn Hauser, OK, *DX Listening Digest*) DX program in Spanish is part of another program, *Club de Amigos*, about half an hour after: Sat 1400 15140, 17690; 2030 17795, 15205; Sun 2200, Mon 0200 15140 (Alpo Heinonen, Finland, *DX Listening Digest*)

EL SALVADOR unID Spanish daily around 20-21 UT with variety of programming. Starts out on 17837v and drifts upward 300-400 Hz per hour, ending up on 17838v. Next day, starts out on 17837v again. Fair on peaks but have been unable to pull an ID or clues as to location (John Wilkins, CO, *Cumbre DX*) Sounds like R. Imperial; see last month

ERITREA/ETHIOPIA [non] United Nations Mission (UNMEE) in English, Oromifa, Amharic and Tigrinya, 500 kW, 225 degrees via Merlin from Dhabbaya, UAE: Tue 0430-0530 15215, Fri 1900-2000 13750 (BC-DX)

FINLAND Despite ambiguous, contradictory schedules, *Capital Weekend* confirmed UT Sun 0000-0100 on 11990 and 13730 (Glenn Hauser, OK, *DX Listening Digest*)

GERMANY DTK heard with a test loop on 25700 at 1140 but not at recheck 1230, in German, English, Dutch, Spanish, a Slavic language, and others, giving address to write for details, but not asking for reports (Alan Roberts, St. Lambert, QC, *DX Listening Digest*) for propagation research?

GUYANA 3291.3 has reappeared, heard at best strength so far, maybe full power, from 0930 with Hindi and English vocals (John Schache, Australia, *ARDXC*) 3291.35, R. Guyana, 0921 classical music, 0931 subcontinental instrumental music. Announcer voice modulation poor, but music levels surprisingly good (Don Nelson, OR, *Cumbre DX*) 3291.256, at 0045, Guyana Broadcasting Corporation again after some time of absence. Request program with greetings (Stig Adolfsson, Sweden, *SW Bulletin*) On 3291.25 relaying BBCWS news and sports at 0730, 0800 program in English on Islam, 0810 Hindi music. Good signal (Marcelo Toniolo, Greenville, NY, *radioescutas*)

IRAQ [non] The Assyrian Democratic Movement, ZOWAA, has confirmed that the unidentified clandestine on 9155 is their station – "Ashur Radio" as they call it. According to ZOWAA, it has been broadcasting towards Northern Iraq on 9155 since April 2000, currently around 1700-1900 daily, mainly in Assyrian (two dialects) with some Arabic. Kurdish is not used. E-mail: info@zowaa.com This domain is registered in Sweden (Bernd Trutenau, Lithuania, *DX Listening Digest*) Check The Democratic Assyrian Movement: <http://www.zowaa.com/index.html> (Tarek Zeidan, Egypt, SU1TZ, BC-DX)

ISRAEL Kol Israel 1900 UT English broadcast (only) is available on-demand on the Reshet Bet website <http://bet.iba.org.il> – French and Spanish too. If this is supposed to replace the israelradio.org broadcasts (and shortwave), I hope that they expand the number of broadcasts on their website! Thanks to Joel Rubin's post for the heads-up (Daniel Rosenzweig, *DX Listening Digest*)

Reorganization of Kol Israel external services at the end of June: Foreign language department will be part of Reshet Aleph. This means the French broadcasts at 1530 and 1930 will remain on SW (Mati Ben-Avraham, Rédacteur-en-chef, Kol Israel via Jean-Michel Aubier) I suppose we could extrapolate this to English at 1600 and 1900, but would prefer to have something explicit (gh)

Galei Zahal, Israel Defense Forces Radio, plays very listenable Israeli pop music mixed with some Euro & American. 0200 with news in Hebrew on 6973. Music and ID jingles followed until off abruptly at 0259, then shifted to daytime frequency 15785 which came on with time pips, ID and news. Very good signal here. Bugle call at 0358 and military march playing while announcers ran down the network stations. Seems to close early on Jewish Sabbath (Saturdays). No mention of their SW outlets in the country listing of WRTN 2002 (John Cobb, GA, *DX Listening Digest*)

JORDAN I have been monitoring Jordan, all in Arabic, except English 11690 UT 1300-1700 kHz (Noel Green, England, *DX Listening Digest*)

KOREA NORTH V. of Korea in English:
0100 3560 6195 7140 11735 13760 15180
1000 3560 9335 11710 11735 13650
1300 4405 9335 11710 13760 15245
1500 4405 9335 11710 13760 15245
1600 3560 9975 11735
1900 4405 11710 13760 15245

Shortwave Broadcasting

2100 4405 13760 15245

(NDXC via Noel Green, BC-DX) At 1000 noted on 13660; more at 0200 on 11845, 15230 or 15240 (Rumen Pankov, Bulgaria, BC-DX)

LAOS [and non] The Chinese-language station heard on 4660v is actually Houa Phan, Laos, trying to relay Vientiane 6130 at 1200-1230, but 6130 has co-channel QRM from CPBS Lhasa transmitted from Xi'an (Alan Davies, Indonesia, BC-DX)

LESOTHO I asked the Transmitter Engineer at Radio Lesotho, Emmanuel Rametse, about the status of 4800 kHz. "Our short wave transmitter is still off due to a problem of spares that are still in the US. These have been ordered and we are expecting them any time from now. I hope as soon as we get the spares we will be able to resume transmission." (George Maroti, NY, late April, Cumbre DX)

MADAGASCAR The pro-Marc Ravalomanana station IDs at MBS Radio, on 9685 // 7130 from 0300 past 1900 (Mahendra Vaghjee, Mauritius, hard-core-dx) 7130, MBS at 1830. At times peaks up nicely with English pops and MBS IDs mentioning "84.4" in French. This is strange, if they refer to FM frequency (Jari Savolainen, Kuusankoski, Finland)

R. Madagascar remains on the air in quite unusual hours – occasionally I hear it after 2300, or even after 2400. Traditional sign-off was 1900 (Vladimir Kovalenko, Tomsk, Russia, Signal)

MÉXICO XERMX website shows a fortnightly program in Portuguese, Sun 1530-1600, O México Dominical, on 9705, 11770, 10 kW, not likely to propagate to Brazil; for Mexico, California, instead? (Marcelo Toniolo, NY, radioescutas)

MONGOLIA Transmitter on 4865 constantly drifts between 4863 and 4867. Mongolia is back again on 4850, distorted at 2340 audible after China closed, before India opened (Vladimir Kovalenko, Tomsk, Russia, Signal) 4850 is used by the 1st Mongolian domestic program, rather than Khekh Tengger. I noted it parallel to LW. Relays Mongolian Service of the Voice of Russia 1100-1200 (Fyodor Brazhnikov, Irkutsk, Russia, MIDXB via Signal)

NAMIBIA NBC transmitters heard in good working order again: Vernaculars 1600-0500 UT 3270.1 kHz, 0500-1600 6060.05; Afrikaans/German same times on 3290.1, 6175.0 (Vashek Korinek, RSA, BC-DX)

NETHERLANDS Alfa Lima International operates almost every week, 15070 around Sat 2300-Sun 0700, give or take, sometimes \ 21900 or 48 mb. Transmitters: one 140 watts, one 350 watts. Antennas: dipoles cut to 15070, 21900; inverted V dipole cut to 6280; all around 20 m above ground. See <http://www.alfalima.net> (ALI, hard-core-dx)

NEW ZEALAND Though in RNZI schedule last month, at 1106-1305 stayed in May on 11675, since it was working well for NZDF in Timor, but might change to 9825 later in winter (Adrian Sainsbury, RNZI, DX Listening Digest) RNZI are keen to start digital; plan to take delivery of a second transmitter capable of digital, in two years time. Two representatives of DRM spent 10 days at RNZI undertaking reception tests (RNZI Mailbox) See also BURMA non

NIGERIA [non] Jakada R. International is new program M/W/F 1900-1930 on 12125. Also on 12125, Voice of Biafra International Sat 1900-2000 and seem to come from same Russian site, Armavir, registered at HFCC as 200 kW, 235 degrees (Wolfgang Büschel, DX Listening Digest) Jakada is the Hausa word for Ambassador. Website: <http://www.geocities.com/nac6015/webs/jakada/> (Ludo Maes, TDP)

Denied radio broadcast licence by the Nigerian authorities, Nigeria's former ambassador to Spain and factional chairman of Alliance for Democracy, Yaro Yusuf Maman began Jakada Radio International on SW to Africa. It broadcasts from Spain. Four other investors are named on the JRI website (Rabi Ibrahim, Daily Trust, Abuja, AllAfrica.com via Mike Dörner) Surely 12125 transmitter is not in Spain. So are production studios and offices actually in Spain? (gh) Inaugural broadcast May 1 of Jakada R. International, called itself "Africa's premier independent radio" (Anker Petersen, Denmark, DX Listening Digest)

PAKISTAN R. Pakistan heard with English news at 1500 on 7093.58 (Kouji Hashimoto, Japan Premium) Same news as on external service, now time-shifted to 1500? (gh)

PERÚ On 4789.88, Radio Atlántida, Iquitos, at 0050, a real reactivation; strong with newscast, man and woman alternating. Mentioned SW 4790 kHz and FM (Björn Malm, Ecuador, SW Bulletin) Used to be one of Peru's most reliable 60m stations (gh)

On 6150.40, C.P.N. Radio, unknown location at 2310. Probably it is ex-Concordia in Arequipa, earlier on 6141.04v, now on a new frequency; Kenneth Olofsson points out that the nominal in WRTH for Concordia is 6150 (Björn Malm, Quito, Ecuador, SW Bulletin) 6150, CPN Radio, at 0600, news and plenty of canned IDs. Totally dominating usual DGS/University Network [COSTA RICA] (Paul Ormandy, New Zealand, DXLD)

On 6560.2, R. Comercial Huancabamba, 2340-0001*, new station, formerly R. Estación 2; folk music, ad for cuandero (Rafael O. Rodríguez R., Santa Fé de Bogotá, Colombia, Conexión Digital)

On 5979.71, Radio Chasqui, Cusco, badly splashed from both sides. Religious programs changed from Indian language to Spanish at 0000, nice ID. 0300 news.

5544.70, Radio San Lorenzo at 0030. New station on SW, but may be same as heard last June on 3120v harmonic, located in parroquia San Lorenzo, la provincia de Cutervo, el departamento de Cajamarca. Just like the station on 3120v they also announce 5545 kHz and MW 1560 (Björn Malm, Quito, Ecuador, SW Bulletin)

PHILIPPINES R. Veritas Asia includes Filipino, all 250 kW, 300 degrees on 15305: 2230-2255, 1500-1525, extended Mon, Tue, Thu and Sat to 1555 (via Fyodor Brazhnikov, SWBC) Filipino segments used to include some English, or at least words (gh)

QATAR QBS cannot be heard on its HFCC schedule, so off the air? 500 kW 0245-0700 9695, 0700-1300 17880, 1300-1700 17795, 1700-2130 7110; 250 kW 0245-2130 17755 (Noel R. Green, UK, BC-DX)

SIERRA LEONE 6137.84, 0515-0537, Radio UNAMSIL with boring male in monotone,

in English with many mentions of peace (Walt Salmani, Victoria, BC) 6137 is new 1 kW SW transmitter that we delivered to the UN in Sierra Leone some time ago. Principal frequency is 6140; other crystals include 6085 and 6110 (Ludo Maes, TDP, Belgium, BC-DX) 6137.84, UN Radio Freetown, 0645/0700 phone-in show. IDs at 0650, 0700, weak and faded badly after 0700 (Kevin Murray, VA, Cumbre DX)

SINGAPORE While I live in Singapore and had at one time even worked within sight of its antennas, I had never been inside the Kranji relay station. I walked past the place two years ago. Yes, you can't get there on a taxi; I took an hour on foot walking in slowly from Choa Chu Kang Road. (Bring plenty of water on a hot day!) The site, in the middle of an atypical rural area for Singapore, shares transmitting facilities with Sincom (Singapore International Communications, the parent organisation of Radio Singapore International). However, it's not the only transmitting facility in the area. The Singtel utility station down the road is actually more extensive. I had once received a QSL card (not a postcard) from the station by sending it to the Turut Track address. Don't know if it still works (Richard Lam, Singapore, ODXA)

UGANDA Radio Uganda's absences from shortwave 4976 and 5026 for a day or two have unfortunately become a feature of this station (Chris Greenway, Kenya, DX Listening Digest)

UK White male journalists ruled over the BBC's World Service with a "colonial mentality" that embarrassed and demeaned ethnic minority colleagues, an investigative tribunal was told. Asian journalist, Sharan Sandhu, 51, claimed that she was repeatedly passed over for promotion between 1994 and 1999 because of her race and sex.

The BBC denies discrimination. The Woburn industrial tribunal in central London was told that Sandhu suffered depression and stress through having to endure a "boys' club" culture in which ethnic minority staff were deliberately kept in junior posts (Dan Milmo, The Guardian via Daniel Say) Then BBC settled for 50 kilopounds

[non] BBCWS added 9825 via Ascension at 2300-0300, 245 degrees to SA; and 12095 switches from Ascension to UK at 2300 instead of 0000 (BC-DX)

USA Music hours inserted into VOA News Now schedule include jazz, Sat and Sun 0900, 1300, 2100 – but not likely to be Willis Conover revived. Weekdays: Music for you from the VOA Music Mix Network at 09, 13, 19 and 21 UT. At 19 Border Crossings. The other hours' music programs rotate:

Mon - American Gold with Ray Freeman
Tue - Roots & Branches with Katherine Cole
Wed - Classic Rock with Ed Kowalski
Thu - Top 20 with Ray McDonald
Fri - Country Hits with Mary Morningstar (VOA website)

Revamped VOA websites no longer mention Arabic. Officially, it's no longer a VOA language. VOA Arabic has been replaced by Radio Sawa, operating on its own at <http://www.radiosawa.com> Radio Sawa never mentions its connection to VOA, despite being administered by VOA (Kim Elliott, DC, DX Listening Digest)

I make daily scans of the 25-26 MHz band, especially in the morning when propagation is best. 25950 in Portland OR has not been heard since last Nov/Dec; 26470 WJFP Fort Pierce not since October. WFLA 25870 is still there most days (Alan Roberts, QU, late April, DX Listening Digest)

Papers were signed and money changed hands and as of April 25 WJCR became the property of Word Broadcasting, WJIE! They plan on using only 7490 initially. May put 13595 back on using the old 270 degree antenna later in the season (Larry Baysinger, KY, Cumbre DX) We've had a few ups and downs but as of May 13th, the SW station is up and running, including World Of Radio M-F at 1245 UT, repeated at 1845 and 0645 Tu-Sa, also several times on weekends in rotation. We have been receiving numerous reception reports, and would appreciate even more. Your program serves a special public service, and we are glad to offer it to our listeners (Doc Burkhart, WJIE Shortwave)

HFCC listings of old WJCR usage showed antenna azimuths, 55 and 155 degrees available. Co-channel problems: Khabarovsk 100 kW 1000-1100, 1200-1300 beamed 65 degrees; Norway 500 kW 0300-0500 95/110 degrees; 1700-2100 180 degrees. So the hours WJIE has 7490 to itself are: 2100-0300, 0500-1000, 1100-1200, 1300-1700. Initially, WJIE was running very low power instead of rated 50 kW. Number of WOR repeats is expected to decline as WJIE accumulates paid programming, but the 1245 airings are supposed to be secure indefinitely (Glenn Hauser, DX Listening Digest)

WBCQ has a show playing some great vintage music immediately following the second broadcast of World Of Radio, Thursday 0530-0600 on 7415, an antidote to a half hour of talk preceding, called Radio D.C. (gh)

VENEZUELA [non] Habana's new posted schedule includes Aló Presidente, the Sunday show of Pres. Chávez, from 1400, usually until about 1830, with some new frequencies: to Caracas 11705; CA 15230; Antilles 6140; USA 17750; Chile 11875 (via Valerio Ferreira, radioescutas) RHC's frequency management wizards did it again: choosing 17750 for Aló, Presidente, clashing with WYFR, longtime user of 17750. There really is no excuse for SW stations in countries adjacent to USA ever using the same frequencies as American stations, but this is not the only example (Glenn Hauser, OK, DX Listening Digest)

VIETNAM Spurious signals +/- 70 kHz for Voice of Vietnam from fundamental 13740: [i.e., 13670, 13810] in the 1100-2127 period \ 11640 (Ivo and Angel! Observer, Bulgaria) VOV at 1815 heard on spurs from 13740, every 10 kHz 13690-13810 (Herman Boel, Flanders, hard-core-dx)

WALES [non] Wales R. International, Celtic Notes, Sat to Asia at 1230-1300 from Ramphisham on new 17845, ex-17615 (Noel R. Green, UK, BC-DX) To avoid Turkey and Portugal both on 17615 (Ivo and Angel! Observer, Bulgaria)

ZIMBABWE [non] R. V. of the People, clandestine via Madagascar, off-frequency 7310.72, *0328:15 with carrier, 0330:05 sign-on tune, ID (Walt Salmani, Victoria, BC, Canada, DX Listening Digest)

Until the Next, Best of DX and 73 de Glenn!

0001 UTC on 6673.9

PERU: Radio Andina. Tentative ID for Spanish evening program. Peruvians audible; **Radio Huanta 2000**, 4746.8, 0918-0923; **Radiodifusoras Huancabamba** 6537.4, 0925-0933; **Radio Cusco** 6193.7, 0935-0947; **Radio del Pacifico** 4975, 1010-1015. (Arnaldo Slaen, Buenos Aires, Argentina)

0006 UTC on 15455

PAKISTAN: Radio Pakistan. English commentary on relations with India, followed by music at 0010. ID at 0016, "you are listening to our English program Good Morning Pakistan." Fair, clear signal with little fading. (Mark Fine, Remington, VA)

0020 UTC on 9400

BULGARIA: Radio Bulgaria. Events & Developments program's focus on the national economy // 7400. Bob Fraser, Cohasset, MA) 0105 on 9400. (Stewart MacKenzie, Huntington Beach, CA)

0030 UTC on 6205

RUSSIA: Radio Rossii. Tentative ID. Lite pops, talk and mentioned of Russia. SIO=232. Monitored in LSB to avoid utility station. (Harold Frodge, Midland, MI) **Voice of Russia** 0200, 9725. (McGuire, Cheverly, MD) 1620 on 7260 with China/Taiwan comments. (MacKenzie, CA) 5940, 2140 with Portraits segment on 20th century's classical composers. (Fraser, MA)

0038 UTC on 5952.5

BOLIVIA: Radio Pio XII. Aymara. Music program presented by male/female duo. Very nice Andean music. SINPO 32432. Bolivians monitored in Spanish & Aymara on subsequent checks; **Radio Fides** 6155, 0050-0100; **Radio Yura** 4716.7, 0105-0111; **Radio San Gabriel** 6085.2, 0115-0120; **Radio Mosoj Chaski** 3310, 0803-0831. (Slaen, ARG) **Radio Pio XII** 5952.5, 2320-2335; **Radio Illimani** 6024, 2300-2320; **Radio Panamericana** 6105, 2335-2345; **Radio Santa Cruz** 6134.8, 0000-0010. (Michael Schnitzer, Hassfurt, Germany/Hard-Core DX)

0015 UTC on 5678

PERU: Radio Ilucan. AM format with many time checks and Huaynos folk music. Ad for Joyeria Cutervo. Station ID at 0019 & 0030, 0033. Monitored to 0202*. (Fernando Garcia, Baltimore, MD) Peruvian's monitored; **Radio Imperio** 4389.2, 0900 with music mix of pop and huaynos to 0908. "Onda Imperial" ID at 0928 followed by religious crusade. QSL promised to me via phone call. **Radio Victoria** 9721, 1050 with religious crusade from Lima. (Garcia, MD; Slaen, ARG) **La Voz del Campesino** 2955.7, 2350 with ad for Tienda Cesar en Kim 61. Greetings and IDs. (Garcia, MD)

0125 UTC on 6055

SPAIN: Radio Exterior Espana. Feature on Catalan folk dances. (Fraser, MA) Audible 2155 on 21740. (MacKenzie, CA)

0140 UTC on 6973.20

ISRAEL: Galei Zahal. Hebrew service to Israel Defense Forces Radio. Initially weak signal observed at tune-in with minimal fading. Evening Israeli pop music program to regular talk and announcement breaks. Signal peaked by 0250 amid national newscast closing with fanfare melody. Greetings to station IDs. (Gayle Van Horn, Brasstown, NC) Monitored 0400+ on 6973, fair-good quality. (Errol Urbelis, Kings Park, NY)

0146 UTC on 6155

URUGUAY: Banda Oriental. Uruguayan folk music non stop. Very nice at SINPO 44433. (Slaen, ARG) **SODRE** 9620.8, 2230-2257, blocked by Spain at 2257. (Schnitzer, Germany/HCDX)

0250 UTC on 6265

ZAMBIA: ZNBC. Bird Cry interval signal at 0249 to 0250. Choral anthem to drum signal. Male announcer at 0252 with heavy English accent, "Zambia" barely audible. SIO=2+53. (Frodge, MI)

0400 UTC on 3270

NAMIBIA: NBC. Spanish service with Aretha Franklin tunes, followed by two anthems, drum chant and identification. Local languages for religious style music. // 3290 covered. SIO= 3+42. (Frodge, MI)

0427 UTC on 12060

MADAGASCAR: Radio Voice of Hope. Noted at sign-on's interval signal. English IDs, schedule and news on peace talks. Vernacular music, noted on Saturday. Good signal // 15320. (Urbelis, NY)

0428 UTC on 12080

SOUTH AFRICA: AWR/Voice of Hope. Tune-in to sign-on ID. Bible program and talks for good signal. AWR/Voice of Hope via **Austria** 0830 & 2100 on 9660. (Urbelis, NY)

0630 UTC on 6350 USB

USA: Armed Forces Radio (Hawaii). Paul Harvey's News & Comment to CNN Radio News segment. Programming // 6458.5 USB (Puerto Rico). AFR military news update. Fair-good signal quality. (Herbert Newberry, Newborn, GA)

0933 UTC on 5990

BRAZIL: Radio Sonado de la Nacion. Portuguese. Regional music to ID at 0938, "esta e a Radio Senado..." SINPO 34232. **Radio Sao Luiz** 1840, 18020 harmonic 1060 kHz. **Radio Rio Mar** 9695, 2210-2230 with sports program. Time check, ID and station promo. (Slaen, ARG) **Radio Riberão Preto** 3205, 2145-2220. Sports, ID, ads, jingles and phone calls. (Schnitzer, Germany/HCDX)

1210 UTC on 9580

AUSTRALIA: Radio Australia. Late Night Live program with political discussion. (Fraser, MA) Audible 2155 on 21740. (MacKenzie, CA) Radio Australia's **Taiwan** relay 11550, 2200-2255. (Urbelis, NY)

1607 UTC on 11690

JORDAN: Radio. English IDs to program preview. Listener's letters and reception reports reviewed. SIO=322+/- USB helps to reduce the interference. (Frodge, MI)

1900 UTC on 11734

ZANZIBAR: Voice of Tanzania. Fair/good for 1900-2100*. Talks and news in Swahili and vernacular music. Some days inaudible. (Urbelis, NY)

1901 UTC on 13865

ICELAND: Ríkisutvarpid. Local languages, heard one "island" mention to brief pop music bumper at 1904*. SIO=2+53. (Frodge, MI)

1930 UTC on 13700

NETHERLANDS: Radio Netherlands. Sound Fountain program's focus on North Sea fishing industry. (Fraser, MA) 9895, 2230-2235 time pips to world newscasts. (McGuire, MD)

2000 UTC on 15150

INDONESIA: Voice of Indonesia. National news, Indo pops and item on tourism. Signal strength usually intermittent most days. (Urbelis, NY) Logged Voice of after trying seven years! Noted on 15149.8 at 2015. Newscast covering South Korean airline crash to music and features. Fair signal with local interferences observed. (Dale M. Fisher, Euclid, OH)

2150 UTC on 21815

COSTA RICA: Radio For Peace Intl. Station identification to item on maritime gear lost at sea. (MacKenzie, CA) Audible 0645 on 7445 USB. (Newberry, GA)

2232 UTC on 4845

MAURITANIA: Radio Mauritanie (Tent) Male/female present Arabic text to chanting amid stringed instruments. SIO=443+. Consistently best 60 meter Afro for many months. (Frodge, MI)

2300 UTC on 9737

PARAGUAY: Radio Nacional. Spanish service for news and public service text. Station IDs to ranchera music. Good signal at 0900 recheck. (Urbelis, NY)

2330 UTC on 9875

LITHUANIA: Radio Vilnius. Station ID, political news and report on poverty in Lithuania. (McGuire, MD)

2330 UTC on 13605

IRAN: VOIRI. Regional music to Arabic announcements. Farsi service audible 2335 on 15084 with interviews. (MacKenzie, CA)

2340 UTC on 15135

MOROCCO: VOA relay. Host comments to ID. Pop music program suffering from HCJB interference on 15140. (MacKenzie, CA)

Thanks to our contributors – Have you sent in YOUR logs?
Send to Gayle Van Horn, c/o Monitoring Times (or e-mail
gayle@webworkz.com) **Please note:** paper strips and cassette
recordings will no longer be accepted.
English broadcast unless otherwise noted.

XVII Commonwealth Games...Simply Brilliant!

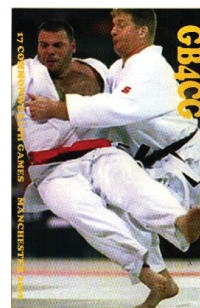
Beginning July 13 - August 5, 2002, international radio amateurs and shortwave listeners will have an opportunity to log and verify the Commonwealth Games from Manchester, England. Akin to the Olympics, the games are held every four years, and are the world's largest sporting event, involving over 70 Commonwealth countries. Several event stations will be operating prior to the games on the ham bands, and one special station will operate during the games.

There will be a special award for hearing the stations. To receive QSL cards direct from this special event, please enclose a self-addressed envelope large enough for the amount of cards you are claiming. Enclose the correct amount of IRCs to cover postage back to your country. Hobbyists residing in the United Kingdom should enclose a large SASE

with sufficient postage for the amounts of cards you wish returned.

For additional Outgoing QSL and Incoming QSLs direct rules refer to, <http://www.geocities.com/gbgames2002>. Information is available on awards and a commemorative picture, plus details of the stations operating and thumbnail photos of QSL cards.

Don't miss this opportunity to verify the Commonwealth Games, it's a brilliant event.



AMATEUR RADIO

Eritrea-E30NA, 10 Meters SSB. Full data color card via DL5NAM. Received in 156 days for two US dollars and a nested Euro envelope (used for reply). QSL Manager: DL5NAM, Chris Sauvageot, Gutfenberg 19, D-91322 Graefenberg, Germany. (Larry Van Horn, NC N5FPW)

ISRAEL

Galei Zahal (Israel Defence Forces Radio) 6973.20 kHz. Full data colored station logo card with greetings from staff, plus station bumper sticker and an assortment of used Israeli postage stamps. Received in 17 days for an English report, two US dollars, souvenir postcard and an addressed nested Euro envelope (used for reply). Noted on card this is a 5kW transmitter located 25 km from Tel Aviv. Station address: Military Post Office 1005, Zahal, Israel. (Gayle Van Horn, Brasstown, NC)

MEDIUM WAVE

KLTH, 1240 kHz AM. Full data card signed by Brian Haerning-Manager. Received in seven days for an AM report. Station address: 992 Island Center Dr., San Bernardino, CA 92408. (Patrick Martin, Seaside, OR)

KOTA, 1380 kHz AM. Partial data verification letter signed by Ted Peiffer-General Manager. Received in 13 days for an AM report and one U.S. dollar (returned with report). Station address: P.O. Box 1760, Rapid City, SD 57709. (Patrick Griffith, CO)

KWDB, 1110 kHz AM. Prepared QSL card returned, signed by Moose Moran-D.J. Received in 10 days for AM follow up report. DJ noted his new slogan is "The Moose is Loose." Station address: P.O. Box 1455, Oak Harbor, WA 98227. (Martin, OR)

WAMB, 1160 kHz AM. Verification letter in stickers signed by W.C. Baird Jr. Received in 48 days for an AM report. Station address: 1617 Lebanon Rd., Nashville, TN 37210. QSL # 2,769. (Martin, OR)

WTAW, 1620 kHz AM. Full data color card unsigned. Received in 25 days for an AM report. Station address: 2700 Earl Rudder Freeway South, College Station, TX 77845. (Martin, OR)

PAPUA NEW GUINEA

Radio Bougainville, 3325 kHz. Partial data verification letter signed by Aloysius L. Rumina. Received in 125 days for an English report, two U.S. dollars and two souvenir color post cards. Station address: P.O. Box 35, Buka, Bougainville, Papua New Guinea. (Frank Hillton, Charleston, SC)

PUERTO RICO

AFRTS-Armed Forces Network, 6458.5 kHz USB. Full data email response letter from JO1 Bruce Moody. Received in four days for an email report to qsl@mediacen.navy.mil. To perk up this verification, I printed it on colored paper stock with a Imprint MT Shadow font for the text. It certainly looks better than a plain generic verification. - ed. (Van Horn, NC)

PERU

La Voz de la Selva, 4825 kHz. Full data card signed by Julia Jauregui-Directora, plus letter, schedule, greeting card and used Peruvian postage stamps. Received in 50 days for a cassette report and two U.S. dollars. Station address: Calle Abtao 55 (Apartado 207) Iquitos, Peru. Email: lvradio@terra.com.pe. (Giampiero Bernardini, Milan, Italy/HCDX)

PHILIPPINES

VOA relay, 9760 kHz. Full data Sao Tome QSL card, signed by John Vodenik. Received in 40 days for an English report. Station address: VOA/IBB Delano Transmitting Station, 11015 Mercer Road, Delano, CA 93215. (George Clement, Powder Springs, GA) Any indication if John verified this relay as Philippines? -ed.

PIRATE

KDAZE, 6925 kHz. Full data personalized Ren & Stimpy "eQSL". Received in one day

for an email report to: kdaze6955@yahoo.com. (Wilkins, MO)

Mystery Science Radio, 6925 kHz. Full data Mystery Science Theater QSL sheet unsigned. Received in three weeks for a pirate report and one US dollar. QSL maildrop: Box 69, Elkhorn, NE 68022. (Wilkins, MO)

SOUTH KOREA

Radio Korea Int'l, 9650 kHz. Full data QSL card plus package of postcards, schedule and sticker. Received in 68 days for an English report and two US dollars. Station address: 18 Yoido-dong, Youngdeungpo-gu, Seoul, Rep. Of Korea 150-790. (Joe Squashic, Wake Forest, NC)

SRI LANKA

VOA relay, 11820 kHz. Full data satellite dishes card signed by John Vodenik. Received in 42 days for an English report. QSL address: (see VOA Philippine relay address). (Clement, GA).

SWEDEN

Radio Sweden, 18960 kHz. Full data signed QSL card plus schedule, station poster and sticker. Received in 12 days for an English report and two US dollars. Station address: SE-105, 10 Stockholm, Sweden. (Squashic, NC)

UTILITY

Australia-VIE, Darwin 10455.5 kHz USB. Full data verification on station letterhead, signed by Adriana Larkin. Received in 59 days for a utility report and one US mint stamp. Station address: Globe Wireless, 550 Pilgrim Dr., Foster City, CA 94404. (Clement, GA)

USA-NOJ, Alaska 6501 kHz USB. Full data famous *Home of the Cable Eating Bears* card signed by David M. Received in 13 months for an English utility report and a souvenir postcard. QSL address: Commanding Officer, USCG Communication Station, P.O. Box 190017, Kodiak, AK 99619-0017. (Wilkins, MO)

Yankee Doodle Shortwave

Since Fourth of July celebrations are just a few days away, this may be a good time to take a tour of U.S. international broadcasting. We begin with the “official” stations; next month we’ll survey the Armed Forces Network (AFN) and the “private” broadcasters.

Although a picture may be worth a thousand words, the opposite isn’t always true – and this is especially the case when it comes to the convoluted world of U.S. international broadcasting. More information is available from the web addresses noted.

❖ Organizational Oversight

At present, the *Broadcasting Board of Governors* (BBG) – created by the International Broadcasting Act of 1994 – oversees the five U.S. non-military international broadcast services: the **Voice of America** (VOA), the Office of Cuba Broadcasting (**Radio and TV Marti**), **WORLDNET** Television and Film Service, **Radio Free Europe/Radio Liberty** (RFE/RL), and **Radio Free Asia** (RFA). It has nine members – including eight appointed by the President and confirmed by the Senate, and the Secretary of State. Marc Nathanson is the current chairman.

The BBG became an independent federal entity on October 9, 1999, and, in theory, serves as a firewall to protect the professional independence and integrity of the broadcasters. (As we saw in the months after the terrorist attacks last September, however, this is not an unchallenged fact.) The BBG also evaluates the mission, operation, and quality of broadcasting activities, allocates funds among the various broadcasters, ensures compliance with broadcasting standards, adds and deletes language services, and submits annual reports to the President and Congress.

VOA, WORLDNET, the Office of Cuba Broadcasting and the Office of Engineering and Technical Services form the *International Broadcasting Bureau* (IBB), structured as an independent federally funded government entity. RFE/RL and RFA are each structured as non-profit corporations funded by congressionally appropriated grants administered by the BBG.

The VOA, Radio Marti, RFE/RL and RFA broadcast on shortwave. Further background, frequency and programming information are available at the noted web sites. VOA English schedules are provided in MT’s SWG.

Voice of America <<http://www.voa.gov>>

The VOA, the only one of these that broadcasts in English, transmits more than 1,000 hours

of programming in 53 languages to an estimated 94 million people each week. Its first radio broadcast was on February 24, 1942. The VOA seeks to position itself as a reliable and authoritative source of news for people around the world. Indeed, the VOA Charter, drafted in 1960 and signed into law in 1976, requires VOA broadcasts to be “accurate, objective, and comprehensive; to represent all segments of American society; to present a balanced view of American thought and institutions; and to clearly present the policies of the United States.”

In English on shortwave, listeners can hear *VOA News Now*, *VOA Africa Service*, *VOA Special English* and, since April, three hours a day of *VOA Music Mix*.

Taken together, and taking into account recent, needed and welcome improvements to the program schedule, these services can be said to demonstrably meet the requirements of the Charter. While the VOA is statutorily barred from serving a stateside audience, shortwave and internet broadcasts are easily receivable in North America around the clock.

A keen debate exists within the U.S. international broadcasting community over whether the VOA and the other services duplicate and unnecessarily overlap one another. In some quarters, it is claimed that the VOA’s charter gives it a substantial responsibility to convey American values, ideas and the reality of American democracy, while focusing on world news and U.S. foreign policies. Coordinately, it is claimed that RFE/RL, Radio Marti and RFA emphasize news and current affairs that pertain directly to the target countries, with very little world news. Others argue that these differences exist much more in theory than they do in practice.

Radio Free Europe/Radio Liberty <<http://www.rferl.org>>

Radio Free Europe/Radio Liberty is the oldest of what used to be referred to as the “surrogate services.” It claims and is accorded considerable respect for its role during the Cold War. Today it is based in Prague and broadcasts to Eastern and Southeastern Europe, Russia, the Caucasus, Central Asia, and the Middle East. RFE/RL radio programs in 27 languages reach 35 million listeners.

RFE/RL’s programming consists almost entirely of news, analysis, and current affairs pro-

gramming. Concentrating on events within this complex region, RFE/RL says it seeks to provide balanced, reliable information to bolster democratic development and market economies in countries where peaceful evolution to civil societies is of vital national interest to the U.S.

While no radio programming is in English, a daily report – *RFE/RL Newslines* – is provided in English and offers analysis on major political events and trends across the organization’s coverage area. Fifteen reports on the region are available free of charge to subscribers via e-mail or fax. The reports are also made available on the RFE/RL website <http://reports.rferl.org>.

Radio Marti <<http://www.ibb.gov/marti/>>

Radio Marti broadcasts news, music, and a variety of feature and news analysis programs in Spanish to Cuba and has sometimes been criticized for what is seen by some as an overly aggressive editorial stance. However, the station’s sound is lively and its music programming is plentiful and pleasant. Radio Marti is easily heard throughout the continent and in Cuba despite the Cuban government’s rather vigorous efforts to jam it.

Radio Free Asia <<http://www.rfa.org>>

Radio Free Asia (RFA) broadcasts in nine languages to China, Tibet, Burma, Cambodia, Laos, Korea and Vietnam. Programming consists primarily of news and commentary as well as feature stories, both political and cultural in nature. The idea for RFA arose in the U.S. Congress following the crackdown on pro-democracy demonstrators at Tiananmen Square in June 1989 and its first broadcast was in Mandarin to China on September 29, 1996. The 1994 International Broadcasting Act states that RFA shall broadcast to countries in Asia that lack the freedom of expression called for in the Universal Declaration of Human Rights.

RFA is also heard quite well in North America even though the transmitters used are in the Pacific and southeast Asia. Listeners may witness Chinese attempts to jam the broadcasts with, among other things, a repetitious loop of traditional music.

Until August, good listening!



**RADIO FREE EUROPE®
RADIO LIBERTY**

"Everyone has the right...
to seek, receive and impart information
and ideas through any media
regardless of frontiers"
UNIVERSAL DECLARATION OF HUMAN RIGHTS



HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af
 ① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Daylight Savings Time) 4, 5, 6, or 7 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each page.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC *Sunday* will be heard on *Saturday* evening in America (in other words, 8:30 pm Eastern, 7:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. On the top half of the page English broadcasts are listed by UTC time on ①, then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not daily, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

Day Codes

s/S	Sunday
m/M	Monday
t/T	Tuesday
w/W	Wednesday
h/H	Thursday
f/F	Friday
a/A	Saturday
D	Daily
mon/MON	monthly

In the same column ⑤, irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-

term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and MT readers to make the Shortwave Guide up-to-date as of one week before print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas

af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
au:	Australia
ca:	Central America
do:	domestic broadcast
eu:	Europe
irr:	irregular (Costa Rica RFPI)
me:	Middle East
na:	North America
om:	omnidirectional
pa:	Pacific
sa:	South America
va:	various

Choose a program or station you want to hear.

Selected programs for prime listening hours appear following the frequencies – space does not permit 24 hour listings nor can every station be listed. However, listings for the most popular stations and selected lesser-known stations illustrate the variety available on shortwave. The format of the listings alternates among three different styles – by station, by genre and by day – month by month. Times listed are approximate and programs are subject to change.

The program listings emphasize broadcasts targeted to North America. In most cases, the stations and programs listed should be readily receivable in North America using a portable radio. Most broadcasters produce one broadcast in English per day that is repeated over a 24 hour period to all areas. If you are able to listen to transmissions to other areas of the world during "non-prime time" hours, referring to the prime time listings for those stations will likely be helpful in determining what programs will be broadcast.

Occasionally, a program or station listing may be followed by a reference to another listing for the same program or station at a different time. This is done to conserve space and make it possible to provide more listings.

MT MONITORING TEAM

Gayle Van Horn Frequency Manager gayle@webworkz.com	John Figlio Program Manager jfiglio1@nycap.rr.com
-----------------------------------------------------------	---------------------------------------------------------

Mark Fine, VA
mark.fine@fineware-swl.com

Program Highlights

John Figlio

Insight Central Europe

In addition to *Network Europe* and *Nordic Report*, there is now a third joint production venture in international broadcasting – *Insight Central Europe*. **Radio Austria International, Radio Slovakia International, Radio Polonia, Radio Prague and Radio Budapest** have teamed up to produce a weekly magazine covering the main developments in the region. The focus is on politics – with particular emphasis on European Union enlargement – as well as on the region's societies, culture and environment. The program, which will also be broadcast as *Central Europe Today*, is carried by all five broadcasters (see the program listings in the *MT SWG*) and is targeted at people worldwide with an interest in Central Europe, including business people, politicians, students, and people with roots in the region.

DX Blockbuster Gone

In order to make room in its schedule for the aforementioned program, **Radio Budapest** has dropped its longstanding Saturday *DX Blockbuster* feature. However, the station says, "[W]e want to minimize the 'damage' to...DX fans... Therefore, we will incorporate the most valuable catches and tips into our monthly *Gatepost*, and in a new feature on Fridays, called *DX Corner*,...we [will] carry the most important and interesting news from...international radio...and of radio amateurs.

Across the Aisle

Things seem to be much more dynamic at the VOA of late. A new occasional feature has been added to *Encounter*, a weekend policy debate program. It's called *Across the Aisle* and features two members of Congress facing off over the merits (or lack thereof) of particular domestic and international legislative proposals. The host is VOA's Director, Robert Reilly.

Talk to Talk to America!

Also, the VOA's *Talk to America* international call-in program is now accepting calls, faxes and e-mails from stateside listeners. Tune in M-F on shortwave at 1700UT (see frequency listings in the *MT SWG*). In addition, audio is streamed from <http://www.voa.gov/talk/ttaudio.html> and the week's schedule of guests and topics is available at <http://www.voa.gov/talk/talksked.html>. The phone number is +1-202-619-3111; fax to +1-202-260-8572; e-mail to talk@voanews.com.



0000 UTC - 8PM E / 7PM C / 5PM P

0000	0015	Cambodia, National Radio Of	11940as			
0000	0015	Japan, Radio	13650as	17810as		
0000	0015	Japan, Radio	6145na	13650as	17810as	
0000	0030	Egypt, Radio Cairo	9900na			
0000	0030	Mexico, Radio Mexico Intl		9705am	11770am	
0000	0030	mtwhf/vl	Solomon Islands, SIBC	5020do		
0000	0030		Sri Lanka, SLBC	4940do		
0000	0030		Thailand, Radio	9690va		
0000	0030	vl	Vanuatu, Radio	4960do	7260do	
0000	0045		India, All India Radio	9705as	9950as	11620as 13605as
0000	0055		Spain, R Exterior Espana	15385na		
0000	0100		Anguilla, Caribbean Beacon	6090am		
0000	0100		Australia, ABC NT Alice Springs	4835do		
0000	0100		Australia, ABC NT Katherine	5025do		
0000	0100		Australia, ABC NT Tennant Crk	4910do		
0000	0100		Australia, Radio	9660pa	12080pa	15240pa 15415as
0000	0100		17580pa 17750as	17775pa	21725as	
0000	0100		Cameroon, RTV	4850do		
0000	0100		Canada, CBC Northern Service	9625do		
0000	0100		Canada, CFRX Toronto ON	6070do		
0000	0100		Canada, CFVP Calgary AB	6030do		
0000	0100		Canada, CKZN St John's NF	6160do		
0000	0100		Canada, CKZU Vancouver BC	6160do		
0000	0100		Canada, Radio Canada Intl	9640as	11895as	
0000	0100		Costa Rica, R for Peace Intl	15050va	21815usb	
0000	0100		Costa Rica, University Network	5030am	6150am	7375am 9725sa
			11870am 13750na			
0000	0100	a/monthly	Finland, Scandv Weekend Radio	5980va	11720va	
0000	0100	m	Finland, YLE/Radio Finland	11990na	13730na	
0000	0100	my/vl	Guatemala, Radio Cultural	3300do	5955do	
0000	0100		Guyana, Voice of	3290do	5950do	
0000	0100		Malaysia, Radio	7295do		
0000	0100		Namibia, NBC	3290do		
0000	0100		Netherlands, Radio	6165na	9845na	
0000	0100		New Zealand, Radio NZ Intl	17675pa		
0000	0100		Russia, University Network	9940as		
0000	0100		Singapore, SBC Radio One	6150do		
0000	0100		UK, BBC World Service	3915as	5875as	5975am 6195va
			9410as 9825sa	11835ca	11765me	11955as 12095sa
			15280as 15310as	15360as	17615as	
0000	0100		Ukraine, R Ukraine Intl	5905as	7320as	12040as
0000	0100		USA, Armed Forces Network	6458usb	10320usb	4319usb 5765usb 6350usb
			USA, KAU Dallas TX	13815va	12579usb	12689usb 13362usb
			USA, KTBK Salt Lk City UT		15590na	
0000	0100		USA, KWHR Naalehu HI	17510as		
0000	0100	twhfa	USA, Voice of America	5995am	6130am	7405am 9455am 9775am
			11695am 13790am			
0000	0100		USA, WBCQ Kennebunk, ME	7415na	9335na	
0000	0100		USA, WEWN Birmingham AL	5825na	9355na	15745na
0000	0100		USA, WHRA Greenbush ME	7580va		
0000	0100		USA, WHRI Noblesville IN	5745va	7315am	
0000	0100		USA, WINB Red Lion PA	12160am		
0000	0100		USA, WJIE Upton KY	7490am		
0000	0100	mtwhf	USA, WRMI Miami FL	7385am		
0000	0100		USA, WRMI Miami FL	9955am		
0000	0100		USA, WRNO New Orleans LA	7355am		
0000	0100		USA, WSHB Cypress Creek SC	7535am	9430sa	15285sa
0000	0100		USA, WTJC Newport NC	9370na		
0000	0100	sm	USA, WWBS Macon GA	11900na		
0000	0100		USA, WWCN Nashville TN	13845na	3210na	5070na 7465na
			13845na			
0000	0100		USA, WWRB Manchester TN	3270va	5085va	6890va 9320va
0000	0100		USA, WYFR Okeechobee FL	6085na	9505na	
0000	0100		Zambia, Christian Voice	4965af		
0000	0115	vl	Pakistan, Radio	11580as	15455as	
0003	0010		Croatia, Croatian Radio	9925sa		
0015	0100		Japan, Radio	6145na		
0030	0100		Iran, VOIRI	9610am	11970am	
0030	0100		Lithuania, R Vilnius	11690na		
0030	0100as/vl		Solomon Islands, SIBC	5020do		
0030	0100		Sri Lanka, SLBC	6005as	6075as	6130do 9770as 15425as
0030	0100		Thailand, Radio	15395na		
0030	0100		UAE, AWR	6035as	6055as	
0030	0100		USA, Voice of America	7215va	9770va	11760va 15185va 15290va
			17740va 17820va			
0055	0100		Italy, RAI Intl	9675na	11800na	

0100 UTC - 9PM E / 8PM C / 6PM P

0100	0115	Italy, RAI Intl	9675na	11800na		
0100	0125	Netherlands, Radio	6165na	9845na		
0100	0127	Czech Rep, Radio Prague Intl	7345na	11615na		
0100	0127	Iran, VOIRI	9610am	11970am		
0100	0127	Vietnam, Voice of	6175na			
0100	0130	s	Germany, Universal Life/Santec	9435as		
0100	0130		Hungary, Radio Budapest	9560na		
0100	0130		Slovakia, R Slovakia Intl	5930na	6190ca	9440sa
0100	0130	twhfa	USA, Voice of America	5995am	6130am	7405am 9455am
			13790am			
0100	0130		Uzbekistan, Radio Tashkent	5025as	7190as	9375as 9530as
0100	0145		Germany, Deutsche Welle	6040na	9640am	11810na
			13720am			
0100	0159		Canada, Radio Canada Intl	5960am	13670am	15170am
			15305am			
0100	0200		Anguilla, Caribbean Beacon	6090am		
0100	0200		Australia, ABC NT Katherine	5025do		
0100	0200		Australia, ABC NT Tennant Crk	4910do		
0100	0200		Australia, Radio	9660pa	12080pa	15240pa 15415as
			17580pa 17750as 17775pa	17795pa	21725as	sikd0602
0100	0200		Canada, CBC Northern Service	9625do		
0100	0200		Canada, CFRX Toronto ON	6070do		
0100	0200		Canada, CFVP Calgary AB	6030do		
0100	0200		Canada, CKZN St John's NF	6160do		
0100	0200		Canada, CKZU Vancouver BC	6160do		
0100	0200		China, China Radio Intl	9580na	9790na	
0100	0200		Costa Rica, R for Peace Intl	15050va	21815usb	
0100	0200		Costa Rica, University Network	5030am	6150am	7375am 9725sa
			11870am 13750na			
0100	0200		Cuba, Radio Havana	6000na	9820na	11705usb
0100	0200		Ecuador, HCJB	9745na	11960na	21455usb
0100	0200	a/monthly	Finland, Scandv Weekend Radio	5980va	11720va	
0100	0200	m/vl	Guatemala, Radio Cultural	3300do	5955do	
0100	0200		Guyana, Voice of	3290do	5950do	
0100	0200		Indonesia, Voice of	9525pa	11785al	15150as
0100	0200		Japan, Radio	11860as	11870me	15325as
			17685pa 17810as	17835sa	17845as	
0100	0200		Malaysia, Radio	7295do		
0100	0200		Namibia, NBC	3290do		
0100	0200		New Zealand, Radio NZ Intl	17675pa		
0100	0200		North Korea, Voice of	6195as	6520am	7140as 7580am 9335as
			11735am			
0100	0200		Russia, University Network	9940as		
0100	0200		Russia, Voice of Russia	9665na	9725na	11825na 12000na
			17595na			
0100	0200		Singapore, SBC Radio One	6150do		
0100	0200	vl	Solomon Islands, SIBC	5020do		
0100	0200		Sri Lanka, SLBC	6005as	6075as	6130do 9770as
			15425as			
0100	0200		UK, BBC World Service	5975am	6195as	9410as 9825as
			11955sa 15280as	15310as	15360au	17615as 17790af
0100	0200		USA, Armed Forces Network	6350usb	6458usb	4319usb 4993usb 5765usb
			13362usb	10320usb	10940usb	12579usb 12689usb
0100	0200		USA, KAU Dallas TX	5755va		
0100	0200		USA, KTBK Salt Lk City UT		7510na	
0100	0200		USA, KWHR Naalehu HI	17510as		
0100	0200		USA, Voice of America	7115me	9635va	11705va 11725va
			11820va 13650va 17740va			
0100	0200		USA, WBCQ Kennebunk, ME	7415na	9335na	
0100	0200		USA, WEWN Birmingham AL	5825na	9355na	15745na
0100	0200		USA, WHRA Greenbush ME	7580va		
0100	0200		USA, WHRI Noblesville IN	5745va	7315am	
0100	0200		USA, WINB Red Lion PA	12160am		
0100	0200		USA, WJIE Upton KY	7490am		
0100	0200		USA, WRMI Miami FL	9955am		
0100	0200		USA, WRNO New Orleans LA	7355am		
0100	0200		USA, WSHB Cypress Creek SC	7535am	9430sa	15285sa
0100	0200		USA, WTJC Newport NC	9370na		
0100	0200		USA, WWCN Nashville TN	3210na	5070na	5935na 7465na
0100	0200		USA, WWRB Manchester TN	5085va	6890va	
0100	0200		USA, WYFR Okeechobee FL	6065na	9505na	15060as
0100	0200		Zambia, Christian Voice	4965af		
0103	0110		Croatia, Croatian Radio	9925sa		
0130	0145	vl	Libya, Voice of Africa	15435irr	17750irr	
0130	0200		Austria, Radio Austria Intl		9870na	
0130	0200		Sweden, Radio	13625va		
0130	0200		UK, RTE Radio	6155na		
0130	0200	twhfa	USA, Voice of America	5995am	6130am	7405va 9455am 9775va
			13740va			

SELECTED PROGRAMMING BEGINS ON PAGE 55

Shortwave Guide



0140	0200	Vatican City, Vatican Radio	9650au	12055au
0145	0200	Albania, Radio Tirana Intl	6115na	7160na

0200 UTC - 10PM E / 9PM C / 7PM P

0200	0227	Czech Rep, Radio Prague Intl	6200na	7345na	
0200	0230	Austria, AWR	9820as		
0200	0230	sm w fa Belarus, Radio Belarus Intl	6070eu	7210eu	
0200	0230	Myanmar, Radio	7185do		
0200	0230	as/vl Solomon Islands, SIBC	5020do		
0200	0245	Germany, Deutsche Welle	11965as	13720as	15370as
0200	0257	Canada, Radio Canada Intl	15260as	17860as	
0200	0300	Anguilla, Caribbean Beacon	6090am		
0200	0300	tw hfa Argentina, RAE	11710am		
0200	0300	Australia, ABC NT Alice Springs	4835do		
0200	0300	Australia, ABC NT Katherine	5025do		
0200	0300	Australia, ABC NT Tennant Crk	4910do		
0200	0300	Australia, Radio	9660pa	12080pa	15240pa 15415as
		15515pa 17580pa	17750as		
0200	0300	Bulgaria, Radio	9400na	11700na	
0200	0300	Canada, CBC Northern Service	9625do		
0200	0300	Canada, CFRX Toronto ON	6070do		
0200	0300	Canada, CFVP Calgary AB	6030do		
0200	0300	Canada, CKZN St John's NF	6160do		
0200	0300	Canada, CKZU Vancouver BC	6160do		
0200	0300	Costa Rica, R for Peace Intl	7455va	15050va	
0200	0300	Costa Rica, University Network	5030am	6150am 7375am 9725sa	
		11870am 13750na			
0200	0300	Cuba, Radio Havana	6000na	9820na	11705usb
0200	0300	Ecuador, HCJB	9745na	11960na	21455usb 21470as
0200	0300	Egypt, Radio Cairo	9475na		
0200	0300	a/monthly Finland, Scandv Weekend Radio	5980va	11720va	
0200	0300	m/vl Guatemala, Radio Cultural	3300do	5955do	
0200	0300	Guyana, Voice of	3290do	5950do	
0200	0300	Kenya, Kenya BC Corp	4885do	4935do	
0200	0300	Malaysia, Radio	7295do		
0200	0300	Namibia, NBC	3290do		
0200	0300	New Zealand, Radio NZ Intl	17675pa		
0200	0300	Philippines, Radio Pilipinas	12015as	15120as 15270as	
0200	0300	Romania, R Romania Intl	9510na	11940na 15105as 15180as	
		17815pa			
0200	0300	Russia, University Network	9940as		
0200	0300	Russia, Voice of Russia	9665na	12000na 17595na	
0200	0300	Singapore, SBC Radio One	6150do		
0200	0300	mtwhf/vl Solomon Islands, SIBC	5020do		
0200	0300	South Korea, R Korea Intl	15575na	7275as 9560na 11725sa 11810sa	
0200	0300	Sri Lanka, SLBC	6005as	6075as 6130do 9770as 15475as	
0200	0300	Taiwan, R Taipei Intl	5950na	11740na 15320as 15345as	
0200	0300	UK, BBC World Service	5975am	6195as 9410as 9510eu 9770af	
		9825sa 11835ca 12095sa	15280as 15310as 15360eu 15470af		
		17790af			
0200	0300	USA, Armed Forces Network	4319usb	4993usb 5765usb 6350usb	
		6458usb 10320usb 10940usb	12579usb 12689usb 13362usb		
0200	0300	USA, KALJ Dallas TX	5755va		
0200	0300	USA, KJES Vado NM	7555na		
0200	0300	USA, KTBN Salt Lk City UT	7510na		
0200	0300	USA, KWHR Naalehu HI	17510as		
0200	0300	USA, Voice of America	7115va	9635va 11705va 11725va 11820va	
		13650va 17740va 17820va			
0200	0300	USA, WBQC Kennebunk, ME	7415na	9335na	
0200	0300	USA, WEWN Birmingham AL	5825na	9355na 15745na	
0200	0300	USA, WHRA Greenbush ME	7580va		
0200	0300	USA, WHRI Noblesville IN	5745va	7315am	
0200	0300	USA, WINB Red Lion PA	12160am		
0200	0300	USA, WJIE Upton KY	7490am		
0200	0300	USA, WRMI Miami FL	7385am		
0200	0300	USA, WRNO New Orleans LA	7355am		
0200	0300	USA, WSHB Cypress Creek SC	5850am	7535eu 9430af	
0200	0300	USA, WTJC Newport NC	9370na		
0200	0300	USA, WWRB Nashville TN	3210na	5070na 5935na 7465na	
0200	0300	USA, WWRB Manchester TN	5085va	6890va	
0200	0300	USA, WYFR Okeechobee FL	6065na	9505na	
0200	0300	Zambia, Christian Voice	4965af		
0203	1215	Cambodia, National Radio Of	11940as		
0203	0210	Croatia, Croatian Radio	9925na		
0215	0220	Nepal, Radio	3230as	5005as	
0230	0257	Vietnam, Voice of	6175na		
0230	0300	Albania, Radio Tirana Intl	6115eu	7160eu	
0230	0300	Hungary, Radio Budapest	9570na		
0230	0300	Slovakia, AWR	7235as		
0230	0300	Sweden, Radio	9490na		
0230	0300	a UK, Wales Radio Intl	9795na		
0230	0300	vl Zambia, Radio ZNBC	4910do	6265al	
0245	0300	as Myanmar, Radio	7185do		
0250	0300	Vatican City, Vatican Radio	7305am	9605am	

0300 UTC - 11PM E / 10PM C / 8PM P

0300	0310	Vatican City, Vatican Radio	7305am	9605am	
0300	0327	Czech Rep, Radio Prague Intl	7345na	7385na 9870na	
0300	0330	Ecuador, HCJB	11960na	21470as	
0300	0330	Egypt, Radio Cairo	9475na		
0300	0330	Philippines, Radio Pilipinas	12015as	15120as 15270as	
0300	0330	S Africa, Channel Africa	6035af		
0300	0330	Thailand, Radio	15395na		
0300	0330	USA, KJES Vado NM	7555na		
0300	0330	USA, KVOH Los Angeles CA	9975na		
0300	0345	Germany, Deutsche Welle	9535na	9640na 11935am	
		15105na			
0300	0356	China, China Radio Intl	9560na	9690na	
0300	0400	Anguilla, Caribbean Beacon	6090am		
0300	0400	Australia, ABC NT Alice Springs	4835do		
0300	0400	Australia, ABC NT Katherine	5025do		
0300	0400	Australia, ABC NT Tennant Crk	4910do		
0300	0400	Australia, Radio	9660pa	12080pa 15240as 15415as	
		15515pa 17580pa	17750as		
0300	0400	vi Botswana, Radio	3356do	4820do 7255do	
0300	0400	Canada, CBC Northern Service	9625do		
0300	0400	Canada, CFRX Toronto ON	6070do		
0300	0400	Canada, CFVP Calgary AB	6030do		
0300	0400	Canada, CKZN St John's NF	6160do		
0300	0400	Canada, CKZU Vancouver BC	6160do		
0300	0400	Costa Rica, R for Peace Intl	7455va	15050va	
0300	0400	Costa Rica, University Network	5030am	6150am 7375am 9725sa	
		11870am 13750na			
0300	0400	Cuba, Radio Havana	6000na	9820na	11705usb
0300	0400	Ecuador, HCJB	9745na	11960na	21455usb
0300	0400	a/monthly Finland, Scandv Weekend Radio	5980va	11720va	
0300	0400	vi Guatemala, Radio Cultural	3300do	5955do	
0300	0400	Guyana, Voice of	3290do	5950do	
0300	0400	Japan, Radio	17825ca	21610pa	
0300	0400	Kenya, Kenya BC Corp	4885do	4935do	
0300	0400	Malaysia, Radio	7295do		
0300	0400	Namibia, NBC	3290do		
0300	0400	New Zealand, Radio NZ Intl	17675pa		
0300	0400	North Korea, Voice of	6195as	7140as 9335as	
0300	0400	Oman, Radio	15355va		
0300	0400	Russia, University Network	17765as		
0300	0400	Russia, Voice of Russia	7180na	9665na 11750na 12000na	
		17565na 17650na 17660na	17690na 6150do		
0300	0400	Singapore, SBC Radio One	6150do		
0300	0400	mtwhf/vl Solomon Islands, SIBC	5020do		
0300	0400	Sri Lanka, SLBC	6005as	6075as 6130do 9770as 15475as	
0300	0400	Taiwan, R Taipei Intl	5950na	11740na 15320as 15345as	
0300	0400	Turkey, Voice of	7270me	11655va	
0300	0400	Uganda, Radio	4976do	5026al	
0300	0400	UK, BBC World Service	3255af	6005af 6190af 6195eu 7120af	
		7160af 9410eu 11730as	11835am 12095sa 15280as 15310as		
		15360as 15420af 15575me	17790as 12040as		
0300	0400	Ukraine, R Ukraine Intl	7150as		
0300	0400	USA, Armed Forces Network	4319usb	4993usb 5765usb 6350usb	
		6458usb 10320usb 10940usb	12579usb 12689usb 13362usb		
0300	0400	USA, KALJ Dallas TX	5755va		
0300	0400	USA, KTBN Salt Lk City UT	7510na		
0300	0400	USA, KWHR Naalehu HI	17510as		
0300	0400	USA, Voice of America	5855af	6080af 7105af 7290af 7340af	
		9575af 9885af 17895af			
0300	0400	USA, WBQC Kennebunk, ME	7415na	9335na	
0300	0400	USA, WEWN Birmingham AL	5825na	7425na 15745na	
0300	0400	USA, WHRA Greenbush ME	7580va		
0300	0400	USA, WHRI Noblesville IN	5745va	7315am	
0300	0400	USA, WJIE Upton KY	7490am		
0300	0400	USA, WMLK Bethel PA	9465eu		
0300	0400	USA, WRMI Miami FL	7385am		
0300	0400	USA, WRNO New Orleans LA	7395am		
0300	0400	USA, WSHB Cypress Creek SC	5850am	7535eu 9455eu 11550va	
0300	0400	USA, WTJC Newport NC	9370na		
0300	0400	USA, WWRB Nashville TN	3210na	5070na 5935na 7465na	
0300	0400	USA, WWRB Manchester TN	5085va	6890va	
0300	0400	USA, WYFR Okeechobee FL	6065na	9505na	
0300	0400	Zambia, Christian Voice	6065af		
0300	0400	vi Zambia, Radio ZNBC	4910do	6265al	
0310	0315	Vatican City, Vatican Radio	7305am	9605am 9660af	
0315	0340	Vatican City, Vatican Radio	9660af		
0330	0345	vi Libya, Voice of Africa	Temt A02 to 10/27/02	15435irr 17750irr	
0330	0350	UAE, Emirates Radio	12005na	13675na 15395na 15435na	
0330	0357	Czech Rep, Radio Prague Intl	11600va	15260va	
0330	0357	Vietnam, Voice of	6175na		
0330	0400	Ecuador, HCJB	11960na		
0330	0400	Malaysia, RTM Kota Kinabalu	5979do		
0330	0400	Nigeria, Radio/Kaduna	4770do		

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0330 0400 Nigeria, Radio/Lagos 3326do 4990al
 0330 0400 Sweden, Radio 9490na
 0330 0400 UAE, AWR 17780as
 0345 0400 f Seychelles, FEBA Radio 11880af
 0345 0400 Tajikistan, Radio 7245as

0400 UTC - 12AM E / 11PM C / 9PM P

0400	0415	Israel, Kol Israel	A02 to 10/06/02	9435na	15640va	17600va
0400	0425	Belgium, RVI Flanders R Intl	15565na			
0400	0430	France Radio France Intl	15155af			
0400	0430	Guatemala, Radio Cultural	3300do	5955do		
0400	0430	Mexico, Radio Mexico Intl	9705am	11770am		
0400	0430	S Africa, AWR	7235af			
0400	0430	S Africa, Channel Africa	5955af			
0400	0430	Sri Lanka, SLBC	6005as	6075as	6130do	9770as 15475as
0400	0445	Germany, Deutsche Welle	6180af	7225af	12045af	13690af
0400	0458	New Zealand, Radio NZ Intl	17675pa			
0400	0500	Anguilla, Caribbean Beacon	6090am			
0400	0500	Australia, ABC NT Alice Springs	4835do			
0400	0500	Australia, ABC NT Katherine	5025do			
0400	0500	Australia, ABC NT Tennant Crk	4910do			
0400	0500	Australia, Radio	9660pa	12080pa	15240pa	15415as
		15515pa	17750as			
0400	0500	Botswana, Radio	3356do	4820do	7255do	
0400	0500	Cameroon, RTV	4850do			
0400	0500	Canada, CBC Northern Service	9625do			
0400	0500	Canada, CFRX Toronto ON	6070do			
0400	0500	Canada, CKZN St John's NF	6160do			
0400	0500	Canada, CKZU Vancouver BC	6160do			
0400	0500	China, China Radio Intl 9730na				
0400	0500	Costa Rica, R for Peace Intl	7455va	15050va		
0400	0500	Costa Rica, University Network	5030am	6150am	7375am	9725sa
		11870am 13750na	17645as			
0400	0500	Cuba, Radio Havana	6000na	9820na	11705usb	
0400	0500	Ecuador, HCJB	9745na	11960na	21455usb	
0400	0500	Finland, Scandv Weekend Radio	5980va	11720va		
0400	0500	Germany, Voice of Hope 15715me				
0400	0500	Guyana, Voice of	3290do	5950do		
0400	0500	Kenya, Kenya BC Corp	4885do	4935do		
0400	0500	Malaysia, Radio	7295do			
0400	0500	Malaysia, RTM Kota Kinabalu	5979do			
0400	0500	Malaysia, Voice of	6175as			
0400	0500	Namibia, NBC	3290do			
0400	0500	Nigeria, Radio/Kaduna	4770do	6090do		
0400	0500	Nigeria, Radio/Lagos	3326do	4990al		
0400	0500	Nigeria, Voice of	7255af			
0400	0500	Romania, R Romania Intl	9510na	11940na	17735as	21480as
0400	0500	Russia, University Network	17765as			
0400	0500	Russia, Voice of Russia	7180na	9665na	11750na	12000na
		17565na 17650na	17660na	17690na		
0400	0500	Singapore, SBC Radio One	6150do			
0400	0500	Solomon Islands, SLBC	5020do			
0400	0500	Uganda, Radio	4976do	5026al	7195al	
0400	0500	UK, BBC World Service	3255af	6005af	6190af	6195af 7120af
		7160af 9410eu	11835am	12095va	15280as	15310as 15420af
		15575va	21660as			
0400	0500	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb
		6458usb 10320usb	10940usb	12579usb	12689usb	13362usb
0400	0500	USA, KAUJ Dallas TX	5755va			
0400	0500	USA, KTBN Salt Lk City UT	7510na			
0400	0500	USA, KWHR Naalehu HI	17780as			
0400	0500	USA, Voice of America	4960af	5855af	6080af	9530va 7275af
		7290af 9575af	11965va	15205va	17895af	
0400	0500	USA, WBCQ Kennebunk, ME	7415na			
0400	0500	USA, WEWN Birmingham AL	5825na	7425na	15745na	
0400	0500	USA, WHRA Greenbush ME	7580va			
0400	0500	USA, WHRI Noblesville IN	5745va	7315am		
0400	0500	USA, WJIE Upton KY	7490am			
0400	0500	USA, WMLK Bethel PA	9465eu			
0400	0500	USA, WRMI Miami FL	7385am			
0400	0500	USA, WSHB Cypress Creek SC	11550am 15195am	5850am	7535eu	9455eu
		USA, WTJC Newport NC	9370na			
0400	0500	USA, WWCR Nashville TN	3210na	5070na	5935na	7560na
0400	0500	USA, WWRB Manchester TN	5085va	6890va		
0400	0500	USA, WYFR Okeechobee FL	6065na	9355eu	9505na	11580eu
0400	0500	Zambia, Christian Voice	6065af			
0400	0500	Zambia, Radio ZNBC	4910do	6265al		
0403	0410	Croatia, Croatian Radio	9925na			
0427	0500	a Madagascar, Radio VO Hope	12060af	15320af		
0430	0500	Italy, IRRS 3985va				
0430	0500	Netherlands, Radio	6165na	9590na		
0430	0500	Nigeria, Radio/Enugu	6025do			
0430	0500	Nigeria, Radio/Ibadan	6050do			
0430	0500	S Africa, AWR	11975af			

0430 0500 Sri Lanka, SLBC 6130do
 0430 0500 Swaziland, TWR 4775af
 0430 0500 mtwhfa Swaziland, TWR 3200af
 0430 0500 UK, BBC World Service 6010eu 9815eu
 0445 0500 Italy, RAI Intl 7235af 9875af
 0459 0500 New Zealand, Radio NZ Intl 11820pa

0500 UTC - 1AM E / 12AM C / 10PM P

0500	0520	Vatican City, Vatican Radio	4005eu	5890eu	7250eu	9660af
		11625af 15570af				
0500	0525	a Madagascar, Radio VO Hope	12060af	15320af		
0500	0530	France Radio France Intl	11685af			
0500	0530	twhta Mexico, Radio Mexico Intl	9705am	11770am		
0500	0530	Netherlands, Radio	6165na	9590na		
0500	0530	S Africa, AWR	5960af	6015af		
0500	0530	S Africa, Channel Africa	11710af			
0500	0530	Uganda, Radio	4976do	5026al	7195al	
0500	0545	Germany, Deutsche Welle	9670na	9785na	11985na	
0500	0600	Anguilla, Caribbean Beacon	6090am			
0500	0600	Australia, ABC NT Alice Springs	4835do			
0500	0600	Australia, ABC NT Katherine	5025do			
0500	0600	Australia, ABC NT Tennant Crk	4910do			
0500	0600	Australia, Radio	9660pa	12080pa	15240pa	15415as
		15515pa 17580pa	17750as	21725as		
0500	0600	mtwhf Bhutan, Bhutan BC Service	5030al	6035do		
0500	0600	vi Botswana, Radio	3356do	4820do	7255do	
0500	0600	irr/vl Cameroon, RTV	4850do			
0500	0600	Canada, CBC Northern Service	9625do			
0500	0600	Canada, CFRX Toronto ON	6070do			
0500	0600	Canada, CKZN St John's NF	6160do			
0500	0600	Canada, CKZU Vancouver BC	6160do			
0500	0600	China, China Radio Intl	9560na			
0500	0600	Costa Rica, R for Peace Intl	7455va	15050va		
0500	0600	Costa Rica, University Network	5030am	6150am	7375am	9725sa
		11870am 13750na	17645as			
0500	0600	Cuba, Radio Havana	9550am	9665usb	9820na	
0500	0600	Ecuador, HCJB	9745na	11960na	21455usb	
0500	0600	a/monthly Finland, Scandv Weekend Radio	6170va	11720va		
0500	0600	Germany, Voice of Hope 15715me	sjd0702			
0500	0600	Guyana, Voice of	3290do	5950do		
0500	0600	vi Italy, IRRS 3985va				
0500	0600	Japan, Radio	5975eu	6110na	7230eu	11715as 11760as
		13630na 15195as	17810as	21755pa		
0500	0600	Kenya, Kenya BC Corp	4885do	4935do		
0500	0600	Liberia, R Liberia Intl	6100do			
0500	0600	Malaysia, Radio	7295do			
0500	0600	Malaysia, RTM Kota Kinabalu	5979do			
0500	0600	Malaysia, Voice of	6175as	9750as	15295as	
0500	0600	Namibia, NBC	3290do			
0500	0600	New Zealand, Radio NZ Intl	11820pa			
0500	0600	Nigeria, Radio/Enugu	6025do			
0500	0600	Nigeria, Radio/Ibadan	6050do			
0500	0600	Nigeria, Radio/Kaduna	4770do	6090do	9570do	
0500	0600	Nigeria, Radio/Lagos	3326do	4990al		
0500	0600	Nigeria, Voice of	7255af			
0500	0600	Russia, University Network	17765as			
0500	0600	Russia, Voice of Russia	17635au	17685au	17795as	21790au
0500	0600	Singapore, SBC Radio One	6150do			
0500	0600	vi Solomon Islands, SLBC	5020do			
0500	0600	Sri Lanka, SLBC	6130do			
0500	0600	Swaziland, TWR	4775af	6035af	9500af	
0500	0600	UK, BBC World Service	6005af	6190af	6195eu	7160af 9410eu
		9875eu 11675eu	11760me	11765af	11940af	11955as 12095eu
		15280as 15310as	15360as	15420af	17640as	17790as 17885af
		17790as				
0500	0600	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb
		6458usb 10320usb	10940usb	12579usb	12689usb	13362usb
0500	0600	USA, KAUJ Dallas TX	5755va			
0500	0600	USA, KTBN Salt Lk City UT	7510na			
0500	0600	USA, KWHR Naalehu HI	11565as	17780as		
0500	0600	USA, Voice of America	5970af	6035af	6080af	7195af 9530va
		11965va 12080af	13670af	15205va		
0500	0600	USA, WBCQ Kennebunk, ME	7415na			
0500	0600	USA, WEWN Birmingham AL	5825na	7425na	15745na	
0500	0600	USA, WHRA Greenbush ME	11730va			
0500	0600	USA, WHRI Noblesville IN	5745va	7315am		
0500	0600	USA, WJIE Upton KY	7490am			
0500	0600	USA, WMLK Bethel PA	9465eu			
0500	0600	USA, WRMI Miami FL	7385am			
0500	0600	USA, WRNO New Orleans LA	7395am			
0500	0600	USA, WSHB Cypress Creek SC	5850am	7535eu	9455eu	9840eu
		11550va				
0500	0600	USA, WTJC Newport NC	9370na			
0500	0600	USA, WWCR Nashville TN	3210na	5070na	5935na	7560na
0500	0600	USA, WWRB Manchester TN	6890va			

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0500	0600	USA, WYFR Okeechobee FL	9355eu		
0500	0600	Zambia, Christian Voice 6065af			
0503	0510	Croatia, Croatian Radio 9925na			
0520	0530	Vatican City, Vatican Radio	9660af	11625af	15570af
0525	0600	Ghana, Ghana BC Corp	3366do	4915do	
	vi				
0530	0550	UAE, Emirates Radio	15435au	17830au	21695au
0530	0600	S Africa, AWR	15105af		
0530	0600	Thailand, Radio	21795eu		
0532	0600	Austria, Radio Austria Intl	6155eu	13730eu	17870me

0600 UTC - 2AM E / 1AM C / 11PM P

0600	0615	S Africa TWR 11640af			
0600	0630	France Radio France Intl	11710af	17800af	21620af
0600	0630	Namibia, NBC	3290do		
0600	0630	S Africa, AWR	15105af		
0600	0630	S Africa, Channel Africa	15215af		
0600	0630	Zimbabwe, ZBC Corp	5975do		
0600	0645	Germany, Deutsche Welle	11925af	13790af	17860af
0600	0658	New Zealand, Radio NZ Intl	11820pa		
0600	0700	Anguilla, Caribbean Beacon	6090am		
0600	0700	Australia, ABC NT Alice Springs	4835do		
0600	0700	Australia, ABC NT Katherine	5025do		
0600	0700	Australia, ABC NT Tennant Crk	4910do		
0600	0700	Australia, Radio	9660pa	12080pa	15415as
		15515pa 17580pa 17750as	21725as		
0600	0700	Botswana, Radio	4820do		
0600	0700	Cameroon, RTV	4850do		
0600	0700	Canada, CFRX Toronto ON	6070do		
0600	0700	Canada, CFVP Calgary AB	6030do		
0600	0700	Canada, CKZN St John's NF	6160do		
0600	0700	Canada, CKZU Vancouver BC	6160do		
0600	0700	Costa Rica, R for Peace Intl	7455va		
0600	0700	Costa Rica, University Network	5030am	6150am	7375am 9725sa
		11870am 13750na 17645as			
0600	0700	Cuba, Radio Havana	9550am	9665usb	9820na
0600	0700	Ecuador, HCJB	11680eu		
0600	0700	Finland, Scandv Weekend Radio	6170va	11720va	
0600	0700	Germany, Deutsche Welle	6140eu		
0600	0700	Ghana, Ghana BC Corp	3366do	4915do	
0600	0700	Guyana, Voice of	5950do		
0600	0700	Italy, IRRS	7120va		
0600	0700	Japan, Radio	7230eu	11740as	13630na 15195as
		17870pa 21755pa			
0600	0700	Kenya, Kenya BC Corp	4885do	4935do	
0600	0700	Liberia, ELWA	4760do		
0600	0700	Liberia, R Liberia Intl	6100do		
0600	0700	Malaysia, Radio	7295do		
0600	0700	Malaysia, Voice of	6175as	9750as	15295as
0600	0700	Nigeria, Radio/Enugu	6025do		
0600	0700	Nigeria, Radio/Ibadan	6050do		
0600	0700	Nigeria, Radio/Kaduna	4770do	6090do	9570do
0600	0700	Nigeria, Radio/Lagos	3326do	4990al	
0600	0700	Nigeria, Voice of	7255af		
0600	0700	Romania, R Romania Intl	9635na	11940na	
0600	0700	Russia, University Network	17765as		
0600	0700	Russia, Voice of Russia	15490au	17635au	17685au 17795as
		21790au			
0600	0700	Sierra Leone, SLBS	3316do		
0600	0700	Singapore, SBC Radio One		6150do	
0600	0700	Solomon Islands, SIBC	5020do		
0600	0700	Swaziland, TWR	4775af	6035af	9500af
0600	0700	UK, BBC World Service	6055af	6190af	9410eu 11765af 11940af
		11955as 12095eu 15310as	15360as	15485eu 15565eu 17640as	
		17760af 17790as 17885af	21660as		
0600	0700	UK, BBC World Service	15400af	15575me	
0600	0700	USA, Armed Forces Network	4319usb	4993usb	5765usb 6350usb
		6458usb 10320usb 10940usb	12579usb	12689usb	13362usb
0600	0700	USA, KAUJ Dallas TX	5755va		
0600	0700	USA, KTBN Salt Lk City UT	7510na		
0600	0700	USA, KWHR Naelehu HI	11565as	17780as	
0600	0700	USA, Voice of America	5970af	6035af	6080af 7195af 9530va
		9760va 11965va 11995af	12080af	13670af 15205va	
0600	0700	USA, WEWN Birmingham AL	5825na	7425na	15745na
0600	0700	USA, WHRA Greenbush ME	11730va		
0600	0700	USA, WHRI Noblesville IN	5745va	7315am	
0600	0700	USA, WJIE Upton KY	7490am		
0600	0700	USA, WMLK Bethel PA	9465eu		
0600	0700	USA, WRMI Miami FL	7385am		
0600	0700	USA, WRNO New Orleans LA	7395am		
0600	0700	USA, WSHB Cypress Creek SC	9455sa	11550am	
0600	0700	USA, WTJC Newport NC	9370na		
0600	0700	USA, WWCR Nashville TN	3210na	5070na	5935na 7560na
0600	0700	USA, WWRB Manchester TN	6890va		
0600	0700	USA, WYFR Okeechobee FL	7355eu	11580eu	
0600	0700	Vanuatu, Radio	4960do	7260do	

0600	0700	Yemen, Rep of Yemen Radio	9780me		
0600	0700	Zambia, Christian Voice 9865af			
0600	0700	Zambia, Radio ZNBC	4910do	6265al	
0630	0700	Ecuador, HCJB	21455usb		
0630	0700	Georgia, Georgian Radio		11805eu	
0630	0700	Vatican City, Vatican Radio	11625af	13765af	15570af
0637	0656	Romania, R Romania Intl	7105eu	9625eu	9550eu 11775eu
0645	0655	Monaco, TWR	9870eu		
0645	0700	Germany, TWR	6045eu		
0655	0700	Germany, TWR	6045eu		
0655	0700	Monaco, TWR	9870eu		
0659	0700	New Zealand, Radio NZ Intl	9885pa		

0700 UTC - 3AM E / 2AM C / 12AM P

0700	0704	Pakistan, Radio	17520as	21465as	
0700	0725	Belgium, RVI Flanders R Intl		5985eu	
0700	0727	Czech Rep, Radio Prague Intl		9880eu	11600eu
0700	0730	Austria, AWR	7230va		
0700	0730	Slovakia, R Slovakia Intl	9440va	15460va	17550va
0700	0750	Germany, TWR	6045eu		
0700	0750	Monaco, TWR	9870eu		
0700	0750	Swaziland, TWR	4775af	6035af	9500af
0700	0800	Anguilla, Caribbean Beacon		6090am	
0700	0800	Australia, ABC NT Alice Springs		4835do	
0700	0800	Australia, ABC NT Katherine		5025do	
0700	0800	Australia, ABC NT Tennant Crk		4910do	
0700	0800	Australia, Radio	9660pa	12080pa	15420pa 15415as
		17580pa 17750as 21725as			
0700	0800	Botswana, Radio	4820do		
0700	0800	Cameroon, RTV	4850do		
0700	0800	Canada, CFRX Toronto ON		6070do	
0700	0800	Canada, CFVP Calgary AB		6030do	
0700	0800	Canada, CKZN St John's NF		6160do	
0700	0800	Canada, CKZU Vancouver BC		6160do	
0700	0800	Costa Rica, R for Peace Intl		7455va	
0700	0800	Costa Rica, University Network		5030am	6150am 7375am 9725sa
		11870am 13750na 17645as			
0700	0800	Ecuador, HCJB		11755pa	21455usb
0700	0800	Eqt Guinea, Radio Africa		15185af	
0700	0800	Eqt. Guinea, Radio East Africa		15185af	
0700	0800	Finland, Scandv Weekend Radio		6170va	11720va
0700	0800	France Radio France Intl		15605af	
0700	0800	Germany, Deutsche Welle		6140eu	
0700	0800	Ghana, Ghana BC Corp		3366do	4915do
0700	0800	Guyana, Voice of		3290do	5950do
0700	0800	Italy, IRRS		7120va	
0700	0800	Kenya, Kenya BC Corp		4885do	4935do
0700	0800	Liberia, ELWA		4760do	
0700	0800	Liberia, R Liberia Intl		6100do	
0700	0800	Malaysia, Radio		7295do	
0700	0800	Malaysia, RTM Kota Kinabalu		5979do	
0700	0800	Malaysia, Voice of		6175as	9750as 15295as
0700	0800	Myanmar, Radio		9730do	
0700	0800	New Zealand, Radio NZ Intl		9885pa	
0700	0800	Nigeria, Radio/Enugu		6025do	
0700	0800	Nigeria, Radio/Ibadan		6050do	
0700	0800	Nigeria, Radio/Kaduna		4770do	6090do 9570do
0700	0800	Nigeria, Radio/Lagos		3326do	4990al
0700	0800	Palau, KHBV/VO Hope		9965as	15725as
0700	0800	Papua New Guinea, NBC		4890do	9675al
0700	0800	Romania, R Romania Intl		21530af	
0700	0800	Russia, University Network		17765as	
0700	0800	Russia, Voice of Russia		15490au	17495au 17525au 17635au 17675as
		17685au 17795as			
0700	0800	Sierra Leone, SLBS		3316do	
0700	0800	Singapore, SBC Radio One		6150do	
0700	0800	Solomon Islands, SIBC		5020do	
0700	0800	Sri Lanka, SLBC		6130do	
0700	0800	Taiwan, R Taipei Intl		5950na	
0700	0800	UK, BBC World Service		6190af	11760me 11765af 11940af 11955as
		12095eu 15310as 15360as		15400af 15565eu 17640af 17760as	
		17790as 17885af 21660as			
0700	0800	USA, Armed Forces Network		4319usb	4993usb 5765usb 6350usb
		6458usb 10320usb 10940usb		12579usb	12689usb 13362usb
0700	0800	USA, KAUJ Dallas TX		5755va	
0700	0800	USA, KTBN Salt Lk City UT		7510na	
0700	0800	USA, KWHR Naelehu HI		11565as	17780as
0700	0800	USA, WEWN Birmingham AL		5825na	7425na 15745na
0700	0800	USA, WHRA Greenbush ME		11730va	
0700	0800	USA, WHRI Noblesville IN		5745va	7315am
0700	0800	USA, WJIE Upton KY		7490am	
0700	0800	USA, WMLK Bethel PA		9465eu	
0700	0800	USA, WRNO New Orleans LA		7395am	
0700	0800	USA, WSHB Cypress Creek SC		9455sa	11550am
0700	0800	USA, WTJC Newport NC		9370na	

Shortwave Guide



0700	0800	USA, WWCR Nashville TN	3210na	5070na	5935na	7560na
0700	0800	USA, WWRB Manchester TN	6890va			
0700	0800	USA, WYFR Okeechobee FL	7355eu	13695af	15170af	
0700	0800	Vanuatu, Radio	4960do	7260do		
0700	0800	Zambia, Christian Voice	9865af			
0700	0800	Zambia, Radio ZNBC	4910do	6265al		
0715	0800	Guam, TWR 11850as	11980as			
0730	0800	Georgia, Georgian Radio	6080me			
0730	0800	Switzerland, Swiss R Intl	15445af	17685af	21750af	
0730	0800	UK, BBC World Service	15575as			
0750	0800	Germany, TWR	6045eu			
0750	0800	Monaco, TWR	9870eu			

0800	0900	USA, WYFR Okeechobee FL	13570af			
0800	0900	Vanuatu, Radio	4960do	7260do		
0800	0900	Zambia, Christian Voice	9865af			
0815	0900	Guam, TWR 15215as	15330as			
0830	0900	Australia, ABC NT Katherine	2485do			
0830	0900	Australia, ABC NT Tennant Crk	2325do			
0830	0900	Austria, AWR	17780af			
0830	0900	Georgia, Georgian Radio	11910eu			
0830	0900	Greece, Voice of	15630eu	17905eu		
0830	0900	Solomon Islands, SIBC	5020do			
0830	0900	Switzerland, Swiss R Intl	21770af			
0840	0850	Turkmenistan, Turkmen Radio	5015as			

0800 UTC - 4AM E / 3AM C / 1AM P

0800	0815	Guam, TWR 15215as				
0800	0820	Germany, TWR	6045eu			
0800	0820	Monaco, TWR	9870eu			
0800	0830	Armenia, Voice of	15270eu			
0800	0830	Australia, ABC NT Alice Springs	4835do			
0800	0830	Australia, ABC NT Katherine	5025do			
0800	0830	Australia, ABC NT Tennant Crk	4910do			
0800	0830	Malaysia, RTM Kota Kinabalu	5979do			
0800	0830	Malaysia, Voice of	6175as	15295as		
0800	0830	Myanmar, Radio	9730do			
0800	0900	Anguilla, Caribbean Beacon	6090am			
0800	0900	Australia, Radio	5995pa	9710pa	12080pa	15240as
		15415as 21725as				
0800	0900	Bhutan, Bhutan BC Service	5030al	6035do		
0800	0900	Botswana, Radio	4820do	7255do		
0800	0900	Cameroon, RTV	4850do			
0800	0900	Canada, CFRX Toronto ON	6070do			
0800	0900	Canada, CFVP Calgary AB	6030do			
0800	0900	Canada, CKZN St John's NF	6160do			
0800	0900	Canada, CKZU Vancouver BC	6160do			
0800	0900	Costa Rica, R for Peace Intl	7455va			
0800	0900	Costa Rica, University Network	5030am	6150am	7375am	9725sa
		11870am 13750na 17645as				
0800	0900	Ecuador, HCJB	11755pa	21455usb		
0800	0900	Eqt Guinea, Radio Africa	15185af			
0800	0900	Eqt. Guinea, Radio East Africa	15185af			
0800	0900	Finland, Scandv Weekend Radio	6170va	11690va		
0800	0900	Germany, Deutsche Welle	6140eu			
0800	0900	Germany, Remnants Hope Minstr	13810as			
0800	0900	Ghana, Ghana BC Corp	3366do	4915do		
0800	0900	Guyana, Voice of	3290do	5950do		
0800	0900	Indonesia, Voice of	9525pa	11785al	15150as	
0800	0900	Italy, IRRS 7120va				
0800	0900	Kenya, Kenya BC Corp	4885do	4935do		
0800	0900	Liberia, ELWA	4760do			
0800	0900	Liberia, R Liberia Intl	6100do			
0800	0900	Malaysia, Radio	7295do			
0800	0900	Malta, VO Mediterranean	9605eu			
0800	0900	New Zealand, Radio NZ Intl	9885pa			
0800	0900	Nigeria, Radio/Enugu	6025do			
0800	0900	Nigeria, Radio/Ibadan	6050do			
0800	0900	Nigeria, Radio/Kaduna	4770do	6090do	9570do	
0800	0900	Nigeria, Radio/Lagos	3326do	4990al		
0800	0900	Nigeria, Voice of	7255af			
0800	0900	Palau, KHBN/VO Hope	9965as	15725as		
0800	0900	Papua New Guinea, NBC	4890do	9675al		
0800	0900	Russia, University Network	17765as			
0800	0900	Russia, Voice of Russia	17495au	17675as	17685au	17795as
0800	0900	Singapore, SBC Radio One	6150do			
0800	0900	South Korea, R Korea Intl	9570om	13670eu		
0800	0900	Sri Lanka, SLBC	6130do			
0800	0900	UK, BBC World Service	6190af	9410eu	11940af	11955as 12095eu
		15310as 15360as 15485eu		15565eu	17640af	17760as 17885af
0800	0900	UK, BBC World Service	15400af	17830af		
0800	0900	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb
		6458usb 10320usb 10940usb		12579usb	13362usb	
0800	0900	USA, KAU Dallas TX	5755va			
0800	0900	USA, KNLS Anchor Point AK	11765as			
0800	0900	USA, KTBN Salt Lk City UT	7510na			
0800	0900	USA, KWHR Naalehu HI	11565as			
0800	0900	USA, Voice of America	11930va	15190va		
0800	0900	USA, WEWN Birmingham AL	5825na	7425na	15745na	
0800	0900	USA, WHRI Noblesville IN	5745va	7315am		
0800	0900	USA, WJIE Upton KY	7490am			
0800	0900	USA, WMLK Bethel PA	9465eu			
0800	0900	USA, WRMI Miami FL	7385am			
0800	0900	USA, WRNO New Orleans LA	7395am			
0800	0900	USA, WSHB Cypress Creek SC	9845au	9860eu	11550am	
0800	0900	USA, WTJC Newport NC	9370na			
0800	0900	USA, WWCR Nashville TN	3210na	5070na	5935na	7560na

0900 UTC - 5AM E / 4AM C / 2AM P

0900	0915	mtwhf/vl	Solomon Islands, SIBC	5020do			
0900	0929		Czech Rep, Radio Prague Intl		21745va		
0900	0930		Austria, AWR	17780af			
0900	0930		Guam, TWR 15330as				
0900	0930	irreg	Liberia, ELWA	4760do			
0900	0945		Germany, Deutsche Welle	6140eu	6160va	9510am	12035af
			15410af 15470as 17715as	17770pa	17800af	17820as	21560af
			21780af 21790pa				
0900	1000		Anguilla, Caribbean Beacon	6090am			
0900	1000		Australia, ABC NT Katherine	2485do			
0900	1000		Australia, ABC NT Tennant Crk	2325do			
0900	1000		Australia, Radio	9580va	15240as	17750as	21820as
0900	1000		Australia, Voice International	17645as			
0900	1000	vl	Botswana, Radio	4820do			
0900	1000	irreg/vl	Cameroon, RTV	4850do			
0900	1000		Canada, CFRX Toronto ON	6070do			
0900	1000		Canada, CFVP Calgary AB	6030do			
0900	1000		Canada, CKZN St John's NF	6160do			
0900	1000		Canada, CKZU Vancouver BC	6160do			
0900	1000		China, China Radio Intl	11730pa			
0900	1000		Costa Rica, R for Peace Intl	7455va			
0900	1000		Costa Rica, University Network	5030am	6150am	7375am	9725sa
			11870am 13750na 17645as				
0900	1000		Ecuador, HCJB	11755pa	21455usb		
0900	1000	mtwhf	Eqt Guinea, Radio Africa	15185af			
0900	1000	as/vl	Eqt. Guinea, Radio East Africa	15185af			
0900	1000	a/monthly	Finland, Scandv Weekend Radio	6170va	11690va		
0900	1000		Germany, Deutsche Welle	6140eu			
0900	1000	vl	Ghana, Ghana BC Corp	4915do			
0900	1000	as/vl	Guyana, Voice of	3290do	5950do		
0900	1000		Italy, IRRS 7120va				
0900	1000		Kenya, Kenya BC Corp	4885do	4935do		
0900	1000		Liberia, R Liberia Intl	6100do			
0900	1000		Malaysia, Radio	7295do			
0900	1000		New Zealand, Radio NZ Intl	9885pa			
0900	1000		Nigeria, Radio/Enugu	6025do			
0900	1000		Nigeria, Radio/Ibadan	6050do			
0900	1000		Nigeria, Radio/Kaduna	4770do	6090do	9570do	
0900	1000		Nigeria, Radio/Lagos	3326do	4990al		
0900	1000		Nigeria, Voice of	7255af			
0900	1000	as/vl	Palau, KHBN/VO Hope	9965as	15725as		
0900	1000		Papua New Guinea, NBC	4890do	9675al		
0900	1000		Russia, University Network	17765as			
0900	1000		Sierra Leone, SLBS	3316do			
0900	1000		Singapore, SBC Radio One	6150do			
0900	1000	as/vl	Solomon Islands, SIBC	5020do			
0900	1000		Sri Lanka, SLBC	6130do			
0900	1000		UK, BBC World Service	6190af	6195eu	9605as	9740as
			11760me 11940af 11945as		12095eu	15310as	15360as 15485eu
			15565eu 17640af 17760as		17790as	21470af	
0900	1000	mtwhf	UK, BBC World Service	15190sa	17830af		
0900	1000		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb
			6458usb 10320usb 10940usb		12579usb	12689usb	13362usb
0900	1000		USA, KAU Dallas TX	5755va			
0900	1000		USA, KTBN Salt Lk City UT	7510na			
0900	1000		USA, KWHR Naalehu HI	11565as			
0900	1000		USA, Voice of America	11930va	15190va		
0900	1000		USA, WEWN Birmingham AL	5825na	7425na	15745na	
0900	1000		USA, WHRA Greenbush ME	11730va			
0900	1000		USA, WHRI Noblesville IN	5745va	7315am		
0900	1000		USA, WJIE Upton KY	7490am			
0900	1000		USA, WRMI Miami FL	9955am			
0900	1000		USA, WSHB Cypress Creek SC	9455sa	9860eu	11550am	
0900	1000		USA, WTJC Newport NC	9370na			
0900	1000		USA, WWCR Nashville TN	3210na	5070na	5935na	7560na 9475na
0900	1000	vl	Vanuatu, Radio	4960do	7260do		
0900	1000	mtwhf	Vatican City, Vatican Radio	5890eu			
0900	1000		Zambia, Christian Voice	9865af			
0930	1000		Georgia, Georgian Radio	11910me			
0930	1000	mtwhf	Guam, TWR 15330as				
0930	1000		Lithuania, R Vilnius	9710eu			
0930	1000		Netherlands, Radio	9790pa	12065as	13710as	

Shortwave Guide



0945 1000 mtwhf/vl Solomon Islands, SIBC 5020do

1000 UTC - 6AM E / 5AM C / 3AM P

1000	1005	vl	Pakistan, Radio	17520as	21465as			
1000	1027		Vietnam, Voice of	9840au	12020au			
1000	1030		Guam, AWR	11560as	11930as			
1000	1030		Mongolia, Voice of	12015as				
1000	1030		Netherlands, Radio	9790pa	12065as	13710as		
1000	1030		Sri Lanka, SLBC	4940do				
1000	1030		UK, RTE Radio	15280au				
1000	1100		Anguilla, Caribbean Beacon	6090am				
1000	1100		Australia, ABC NT Katherine	2485do				
1000	1100		Australia, ABC NT Tennant Crk	2325do				
1000	1100		Australia, Radio	9580va	11880as	15240as	17750as	21820as
1000	1100		Australia, Voice International	13685as				
1000	1100	as	Bhutan, Bhutan BC Service	5030al	6035do			
1000	1100	vl	Botswana, Radio	4820do	7255do			
1000	1100	irrg/vl	Cameroon, RTV	4850do				
1000	1100		Canada, CFRX Toronto ON	6070do				
1000	1100		Canada, CFVP Calgary AB	6030do				
1000	1100		Canada, CKZN St John's NF	6160do				
1000	1100		Canada, CKZU Vancouver BC	6160do				
1000	1100		China, China Radio Intl	11730pa	15210pa			
1000	1100		Costa Rica, R for Peace Intl	7455va				
1000	1100		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na	17645as				
1000	1100		Ecuador, HCJB	11755pa	21455usb			
1000	1100	mtwhf	Eqt Guinea, Radio Africa	15185af				
1000	1100	as/vl	Eqt. Guinea, Radio East Africa	15185af				
1000	1100	a/monthly	Finland, Scandv Weekend Radio	6170va	11690va			
1000	1100		Germany, Deutsche Welle	6140eu				
1000	1100	vl	Ghana, Ghana BC Corp	4915do				
1000	1100		Guyana, Voice of	3290do	5950do			
1000	1100		India, All India Radio	11585as	13695au	15020as	15260as	
			17510au 17800au	17895au				
1000	1100	as/vl	Italy, IRRS 7120va					
1000	1100		Japan, Radio	9695as	15590as	21755pa		
1000	1100		Liberia, R Liberia Intl	6100do				
1000	1100		Malaysia, Radio	7295do				
1000	1100		New Zealand, Radio NZ Intl	9885pa				
1000	1100		Nigeria, Radio/Enugu	6025do				
1000	1100		Nigeria, Radio/Ibadan	6050do				
1000	1100		Nigeria, Radio/Kaduna	4770do	6090do	9570do		
1000	1100		Nigeria, Radio/Lagos	3326do	4990al			
1000	1100		Nigeria, Voice of	7255af				
1000	1100		Palau, KHBN/VO Hope	9965as	9985as	12160as	15725as	
1000	1100		Papua New Guinea, NBC	4890do	9675al			
1000	1100		Russia, University Network	17765as				
1000	1100		Singapore, SBC Radio One	6150do				
1000	1100	vl	Solomon Islands, SIBC	5020do				
1000	1100		UK, BBC World Service	6190af	6195va	9605as	9740as	
			11760me 11945af	12095eu	15280as	15310as	15335as	15360as
			15485eu 15565eu	15575as	17640af	17790as	17885af	21730af
			21470as 21660as					
1000	1100		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
			6458usb 10320usb	10940usb	12579usb	12689usb	13362usb	
1000	1100		USA, KAUJ Dallas TX	5755va				
1000	1100		USA, KTBN Salt Lk City UT	7510na				
1000	1100		USA, KWHR Naalehu HI	9930as	11565pa			
1000	1100		USA, Voice of America	5745am	7370am	9590am	9770va	15240va
			15425va					
1000	1100		USA, WEWN Birmingham AL	7425na	7520na	9465na	15405eu	
			15745eu					
1000	1100		USA, WHRI Noblesville IN	6040na	9495am			
1000	1100	as	USA, WINB Red Lion PA	13570am				
1000	1100		USA, WJIE Upton KY	7490am				
1000	1100		USA, WRMI Miami FL	9955am				
1000	1100		USA, WRNO New Orleans LA	7395am				
1000	1100		USA, WSHB Cypress Creek SC	6095am	9455am			
1000	1100		USA, WTJC Newport NC	9370na				
1000	1100		USA, WWCN Nashville TN	5070na	5935na	7560na		
			15825na					
1000	1100		USA, WYFR Okeechobee FL	5950na				
1030	1035		Israel, Kol Israel	A02 to 10/06/02	15640va	17545va		
1030	1045	mtwhf	Ethiopia, Radio	5990do	7110do	9704do		
1030	1057		Czech Rep, Radio Prague Intl	9880eu	11615eu			
1030	1100		Guam, AWR	11560as				
1030	1100		Netherlands, Radio	5965na	6045eu	9790pa	9860eu	12065as
			13710as					
1030	1100		Sri Lanka, SLBC	4940do	11835as	15120as	17850as	
1030	1100		UAE, Emirates Radio	13675eu	15370eu	15400eu	21597eu	

1100 UTC - 7AM E / 6AM C / 4AM P

1100	1105		New Zealand, Radio NZ Intl	9885pa				
1100	1120	fa	Kazakhstan, R Almaty	9620eu	11840eu			
1100	1127		Vietnam, Voice of	7285as				
1100	1130	as	Bhutan, Bhutan BC Service	5030al	6035do			
1100	1130		Netherlands, Radio	5965na	6045eu	9790pa	9860eu	12065as
			13710as					
1100	1130		Sri Lanka, SLBC	4940do	11835as	15120as	17850as	
1100	1130	mtwhf	UK, BBC World Service	15220am				
1100	1130		UK, BBC World Service	15400af	17790as			
1100	1145		Germany, Deutsche Welle	11785af	15410af	17860af	21665af	
1100	1200		Anguilla, Caribbean Beacon	6020pa	11775am			
1100	1200		Australia, ABC NT Katherine	2485do				
1100	1200		Australia, ABC NT Tennant Crk	2325do				
1100	1200		Australia, Radio	5995pa	6020pa	9475as	9580pa	
			11650pa 11880as	12080pa	15240as	21820as		
1100	1200		Australia, Voice International	13635as				
1100	1200	vl	Austria, Radio Africa Intl	17815eu				
1100	1200		Bulgaria, Radio	15700eu	17500eu			
1100	1200		Canada, CFRX Toronto ON	6070do				
1100	1200		Canada, CFVP Calgary AB	6030do				
1100	1200		Canada, CKZN St John's NF	6160do				
1100	1200		Canada, CKZU Vancouver BC	6160do				
1100	1200		Costa Rica, R for Peace Intl	7455va				
1100	1200		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na	17645as				
1100	1200		Ecuador, HCJB	12005am	15115na	21455usb		
1100	1200	mtwhf	Eqt Guinea, Radio Africa	15185af				
1100	1200	as/vl	Eqt. Guinea, Radio East Africa	15185af				
1100	1200	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va			
1100	1200		Germany, Deutsche Welle	6140eu				
1100	1200	vl	Ghana, Ghana BC Corp	4915do				
1100	1200		Guyana, Voice of	3290do	5950do			
1100	1200		Iran, VOIRI	15215as	15585as	15600as	21470as	21730au
1100	1200	as/vl	Italy, IRRS 7120va					
1100	1200		Japan, Radio	6120na	9695as	15590as		
1100	1200		Jordan, Radio	11690eu				
1100	1200		Malaysia, Radio	7295do				
1100	1200		Palau, KHBN/VO Hope	9965as	9985as	12160as	13840as	
1100	1200		Papua New Guinea, NBC	4890do	9675al			
1100	1200		Russia, University Network	17765as				
1100	1200		Singapore, R Singapore Intl	6150as	9600as			
1100	1200		Taiwan, R Taipei Intl	7445as	11985as			
1100	1200		UK, BBC World Service	6190af	6195va	9605as	9740as	
			11760me 11945as	12095eu	12105sa	15190va	15220am	15280as
			15310as 15400af	15485eu	15565eu	15575as	17640af	17700eu
			17760as 17830af	17885af	21470af	21660as		
1100	1200		Ukraine, R Ukraine Intl	11840na	15520na			
1100	1200		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
			6458usb 10320usb	10940usb	12579usb	12689usb	13362usb	
1100	1200		USA, KAUJ Dallas TX	5755va				
1100	1200		USA, KTBN Salt Lk City UT	7510na				
1100	1200		USA, KWHR Naalehu HI	9930as	11565pa			
1100	1200		USA, Voice of America	6160va	9645va	9760va	9770va	15190va
			15240va 15425va					
1100	1200		USA, WEWN Birmingham AL	7425na	7520na	9465na	15405eu	
			15745eu					
1100	1200		USA, WHRI Noblesville IN	6040na	9495am			
1100	1200		USA, WINB Red Lion PA	13570am				
1100	1200		USA, WJIE Upton KY	7490am				
1100	1200		USA, WRMI Miami FL	9955am				
1100	1200		USA, WRNO New Orleans LA	7395am				
1100	1200		USA, WSHB Cypress Creek SC	6095am	9455am	11660am		
1100	1200		USA, WTJC Newport NC	9370na				
1100	1200		USA, WWCN Nashville TN	5070na	5935na	7560na		
			15825na					
1100	1200		USA, WYFR Okeechobee FL	5850na	5950na	11725sa		
1106	1200		New Zealand, Radio NZ Intl	11675pa				
1115	1145		Nepal, Radio	3230as	5005as			
1120	1140	w	Kazakhstan, R Almaty	9620eu	11840eu			
1130	1145	vl	Libya, Voice of Africa	Temt A02 to 10/27/02	15435irr	17750irr		
1130	1155		Belgium, RVI Flanders R Intl	9865as				
1130	1200		Austria, Radio Austria Intl	6155eu	13730eu	21780as		
1130	1200		Netherlands, Radio	5965na	6045eu	9860eu		
1130	1200		South Korea, R Korea Intl	9650na				
1130	1200		Sri Lanka, SLBC	4940do				
1130	1200		Sweden, Radio	17505va	18960na			
1130	1200	mtwhf	UK, BBC World Service	11835am	15190sa			
1130	1200	f	Vatican City, Vatican Radio	15595va	17515va			
1140	1200	t	Kazakhstan, R Almaty	9620eu	11840eu			
1155	1200	vl	Zimbabwe, ZBC Corp	5975do				

Shortwave Guide

MT

1200 UTC - 8AM E / 7AM C / 5AM P

1200	1215	UK, BBC World Service	7135af				
1200	1225	Netherlands, Radio	5965na	6045eu	9860eu		
1200	1227	Iran, VOIRI	15215as	15585as	15600as	21470as	21730au
1200	1230	France Radio France Intl	15540af	25820af			
1200	1230	Mongolia, Voice of	12015eu				
1200	1230	South Korea, R Korea Intl		9650na			
1200	1230	Uzbekistan, Radio Tashkent		5975as	7285as	9715as	15295as
		17775as					
1200	1230	vi	Zimbabwe, ZBC Corp	5975do			
1200	1259		Poland, Radio Polonia	6095eu	9525eu	11820eu	
1200	1300		Anguilla, Caribbean Beacon		11775am		
1200	1300		Australia, ABC NT Katherine		2485do		
1200	1300		Australia, ABC NT Tennant Crk		2325do		
1200	1300		Australia, Radio	5995pa	6020pa	9475as	9580pa
			11650pa	11880as	21820as		
1200	1300		Australia, Voice International		13635as		
1200	1300		Bangladesh, Bangla Betar		7185as	9550as	
1200	1300		Canada, CBC Northern Service		9625do		
1200	1300		Canada, CFRX Toronto ON		6070do		
1200	1300		Canada, CFVP Calgary AB		6030do		
1200	1300		Canada, CKZN St John's NF		6160do		
1200	1300		Canada, CKZU Vancouver BC		6160do		
1200	1300		Canada, Radio Canada Intl		9660as	15190as	
1200	1300	mtwhf	Canada, Radio Canada Intl		9515na	13655na	17820na
1200	1300		China, China Radio Intl	9730as	9760as	11760pa	11855pa
			15415pa				11980as
1200	1300		China, Voice of Hope	7485as			
1200	1300		Costa Rica, R for Peace Intl		21815usb		
1200	1300		Costa Rica, University Network		5030am	6150am	7375am
			11870am	13750na	17645as		9725sa
1200	1300		Ecuador, HCJB	12005am	15115na	21455usb	
1200	1300	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va	
1200	1300		Germany, Deutsche Welle		6140eu		
1200	1300		Germany, Overcomer Ministries		5975eu		
1200	1300	as	Germany, Remnants Hope Minstr		6110eu		
1200	1300		Guyana, Voice of		3290do		
1200	1300	as/vl	Italy, IRRS	7120va			
1200	1300		Jordan, Radio		11690eu		
1200	1300		Malaysia, Radio		7295do		
1200	1300		New Zealand, Radio NZ Intl		11675pa		
1200	1300	mtwhfa	Palau, KHBN/VO Hope	9965as	9985as	12160as	13840as
1200	1300		Papua New Guinea, NBC		4890do	9675al	
1200	1300		Russia, University Network		17765as		
1200	1300		Singapore, R Singapore Intl		6150as	9600as	
1200	1300		Taiwan, R Taipei Intl	7130as	9610au		
1200	1300		UK, BBC World Service	6190af	6195va	9605as	9740as
			11760me	11945as	12095eu	15190va	15310as
			15565eu	15575as	17640af	17700eu	17785af
			21660as				
1200	1300		USA, Armed Forces Network		4319usb	4993usb	5765usb
			6458usb	10320usb	10940usb	12579usb	13362usb
1200	1300		USA, KALJ Dallas TX		13815va		
1200	1300		USA, KTBN Salt Lk City UT		7510na		
1200	1300		USA, KWHR Naalehu HI	9930as	11565pa		
1200	1300		USA, Voice of America	6160va	9645va	9760va	15160va
			15425na			15240va	
1200	1300		USA, WVEWN Birmingham AL		9465na	11550na	11875na
			15745eu			15405eu	
1200	1300		USA, WHRI Noblesville IN		6040na	9495am	
1200	1300		USA, WINB Red Lion PA	13570am			
1200	1300		USA, WJIE Upton KY	7490am			
1200	1300		USA, WRMI Miami FL	15725am			
1200	1300		USA, WRNO New Orleans LA		7395am		
1200	1300		USA, WSHB Cypress Creek SC		6095am	9455am	11660am
1200	1300		USA, WTJC Newport NC	9370na			
1200	1300		USA, WWCR Nashville TN		7560na	12160na	13845na
			15825na				
1200	1300		USA, WYFR Okeechobee FL		5850na	5950na	13695na
			17750na				
1230	1257	mtwhfa	Vietnam, Voice of	9840as	12020as		
1230	1300		Finland, YLE/Radio Finland		15400na	17670na	
1230	1300		Sri Lanka, SLBC	4940do	6005as	6075as	9770as
1230	1300		Sweden, Radio	17505va	18960na	21530as	15425as
1230	1300		Thailand, Radio		9885va		
1230	1300		Turkey, Voice of	17615as	17830eu		
1230	1300	a	UK, Wales Radio Intl	17845au			
1245	1300	tfa	Seychelles, FEBA Radio	15535me			

1300 UTC - 9AM E / 8AM C / 6AM P

1300	1310		New Zealand, Radio NZ Intl	11675pa			
1300	1310	mtwhfa	Turkmenistan, Turkmen Radio	5015as			

1300	1329		Czech Rep, Radio Prague Intl	13580eu	21745as		
1300	1330		Guam, AWR	15385as			
1300	1330		Turkey, Voice of	17615as	17830eu		
1300	1330		UAE, AWR	17740as			
1300	1400		Anguilla, Caribbean Beacon		11775am		
1300	1400		Australia, ABC NT Katherine		2485do		
1300	1400		Australia, ABC NT Tennant Crk		2325do		
1300	1400		Australia, Radio	5995pa	6020pa	9475as	9580pa
			11650pa	11880as	21820as		
1300	1400		Australia, Voice International		13635as		
1300	1400		Canada, CBC Northern Service		9625do		
1300	1400		Canada, CFRX Toronto ON		6070do		
1300	1400		Canada, CFVP Calgary AB		6030do		
1300	1400		Canada, CKZN St John's NF		6160do		
1300	1400		Canada, CKZU Vancouver BC		6160do		
1300	1400		Canada, Radio Canada Intl		9515na	13655na	
1300	1400as		Canada, Radio Canada Intl		17820na		
1300	1400		China, China Radio Intl	7405na	9570pa	11760pa	11980as
1300	1400		China, Voice of Hope	7485as			
1300	1400		Costa Rica, R for Peace Intl		21815va	21815usb	
1300	1400		Costa Rica, University Network		5030am	6150am	7375am
			11870am	13750na	17645as		9725sa
1300	1400		Ecuador, HCJB	12005am	15115na	21455usb	
1300	1400	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va	
1300	1400		Germany, Deutsche Welle		6140eu		
1300	1400		Germany, Overcomer Ministries		5975eu	13810af	
1300	1400	as/vl	Italy, IRRS	7120va			
1300	1400		Jordan, Radio		11690eu		
1300	1400		Malaysia, Radio		7295do		
1300	1400		North Korea, Voice of	7505eu	9335na	11335eu	11710na
1300	1400		Palau, KHBN/VO Hope	9965as	9985as	12160as	13840as
1300	1400	mtwhfa	Papua New Guinea, NBC		4890do	9675al	
1300	1400		Russia, University Network		17765as		
1300	1400	as	S Africa, Channel Africa	11720af	17780af	21725af	
1300	1400		Singapore, R Singapore Intl		6150as	9600as	
1300	1400		South Korea, R Korea Intl		9570as	13670am	
1300	1400		Sri Lanka, SLBC	4940do	6005as	6075as	9770as
1300	1400		UK, BBC World Service	6190af	6195va	6075as	9770as
			11760me	11940af	12095eu	12105sa	15190va
			15565eu	15420af	15485eu	15575eu	15285as
			17830af	17885af	21470af	17640af	15310as
1300	1400		USA, Armed Forces Network		4319usb	4993usb	5765usb
			6458usb	10320usb	10940usb	12579usb	6350usb
1300	1400		USA, KALJ Dallas TX		13815va		
1300	1400		USA, KNLS Anchor Point AK		11870as		
1300	1400		USA, KTBN Salt Lk City UT		7510na		
1300	1400		USA, KWHR Naalehu HI	9930as	11565pa		
1300	1400		USA, Voice of America	6160va	9645va	9760va	15160va
1300	1400		USA, WBCQ Kennebunk, ME		17495na		15425va
1300	1400		USA, WVEWN Birmingham AL		11550na	11875na	15405eu
1300	1400		USA, WHRI Noblesville IN		6040na	15105am	15745eu
1300	1400		USA, WINB Red Lion PA	13570am			
1300	1400		USA, WJIE Upton KY	7490am			
1300	1400		USA, WRMI Miami FL	15725am			
1300	1400		USA, WRNO New Orleans LA		7395am		
1300	1400		USA, WSHB Cypress Creek SC		9430na	9455am	
1300	1400		USA, WTJC Newport NC	9370na			
1300	1400		USA, WWCR Nashville TN		9475na	12160na	13845na
			15825na				
1300	1400		USA, WWRB Manchester TN		9320va	9400va	9495va
1300	1400		USA, WYFR Okeechobee FL		11550as	11830na	12172va
			11970na	17510sa	17750na		
1310	1400	occasional	New Zealand, Radio NZ Intl		6095pa		
1330	1350		UAE, Emirates Radio	13630eu	13675eu	15400eu	21597eu
1330	1357		Vietnam, Voice of	7145eu	9730eu		
1330	1400		Austria, Radio Austria Intl		6155eu	13730eu	
1330	1400		Guam, AWR	11705as	11980as		
1330	1400		India, All India Radio	9690as	11620as	13710as	
1330	1400		Laos, Lao National Radio		7145as		
1330	1400		Sweden, Radio	17505va	18960na		
1330	1400		UAE, AWR	15320as			
1330	1400		Uzbekistan, Radio Tashkent		5975as	7285as	9715as
			17775as			15295as	

1400 UTC - 10AM E / 9AM C / 7AM P

1400	1415	mtwhf	UK, BBC World Service	11860af	21490af		
1400	1430		Ecuador, HCJB	12005am	15115na	21455usb	
1400	1430		Thailand, Radio	9830va			
1400	1500		Anguilla, Caribbean Beacon		11775am		
1400	1500		Australia, ABC NT Katherine		2485do		
1400	1500		Australia, ABC NT Tennant Crk		2325do		
1400	1500		Australia, Radio	5995pa	9580pa	11650pa	11660as
1400	1500		Australia, Voice International		13635as		
1400	1500		Canada, CBC Northern Service		9625do		

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1400	1500	Canada, CFRX Toronto ON	6070do						
1400	1500	Canada, CFVP Calgary AB	6030do						
1400	1500	Canada, CKZN St John's NF	6160do						
1400	1500	Canada, CKZU Vancouver BC	6160do						
1400	1500	Canada, Radio Canada Intl	9515na	13655na	15305na				
		17820na							
1400	1500	China, China Radio Intl 7405na	9700as	11675pa	13685va	15125as			
		17720na							
1400	1500	China, Voice of Hope	7485as						
1400	1500	Costa Rica, R for Peace Intl	21815va	21815usb					
1400	1500	Costa Rica, University Network	5030am	6150am	7375am	9725sa			
		11870am 13750na 17645as							
1400	1500	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va				
1400	1500		France Radio France Intl 11610af	17620af					
1400	1500		Germany, Deutsche Welle	6140eu					
1400	1500		Germany, Overcomer Ministries	5975eu	13810af				
1400	1500		India, All India Radio	9690as	11620as	13710as			
1400	1500	as/vl	Italy, IRRS	7120va					
1400	1500		Japan, Radio	7200as	9505na	11730as	17755me		
1400	1500		Jordan, Radio	11690eu					
1400	1500	occasional	New Zealand, Radio NZ Intl	6095pa					
1400	1500		Oman, Radio	15140va					
1400	1500		Palau, KHBN/VO Hope	9965as	9985as	12160as	13840as		
1400	1500	mtwhfa	Papua New Guinea, NBC	4890do	9675al				
1400	1500		Romania, R Romania Intl	15250eu	17735eu				
1400	1500		Russia, University Network	17765as					
1400	1500		Russia, Voice of Russia	7390as	9745as	12055as	15560as	17645as	
1400	1500	as	S Africa, Channel Africa	11720af	17780af	21725af			
1400	1500		Singapore, SBC Radio One	6150do					
1400	1500		Sri Lanka, SLBC	4940do	6005as	6075as	9770as	15425as	
1400	1500		Taiwan, R Taipei Intl	15265as					
1400	1500		UK, BBC World Service	6190af	6195va	9605as	9740as	12095eu	
			12105sa 15105af	15190va	15285as	15310as	15365as	15420af	
			15575eu 15595eu	17640af	17810sa	17830af	21470af		
1400	1500		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb		
			6458usb 10320usb	10940usb	12579usb	12689usb	13362usb		
1400	1500		USA, KAU Dallas TX	13815va					
1400	1500		USA, KJES Vado NM	11715na					
1400	1500		USA, KTBN Salt Lk City UT	7510na					
1400	1500		USA, KWHR Naalehu HI	9930as	11565pa				
1400	1500		USA, Voice of America	6160va	7125va	9760va	15160va	15255va	
			15425va						
1400	1500		USA, WBQC Kennebunk, ME	17495na					
1400	1500		USA, WEWN Birmingham AL	11550na		11875na	15375na	15745eu	
1400	1500		USA, WHRI Noblesville IN	6040na	15105am				
1400	1500		USA, WINB Red Lion PA	13570am					
1400	1500		USA, WJIE Upton KY	7490am					
1400	1500		USA, WRMI Miami FL	15725am					
1400	1500		USA, WRNO New Orleans LA	7395am					
1400	1500		USA, WTJC Newport NC	9370na					
1400	1500		USA, WWCN Nashville TN	9475na	12160na	13845na			
			15825na						
1400	1500		USA, WWRB Manchester TN	9320va	9400va	12172va			
1400	1500		USA, WYFR Okeechobee FL	11550as	11830na	11865sa			
			11970na 17510sa	17750na					
1415	1420		Nepal, Radio	3230as	5005as				
1430	1500		Guam, TWR 15330as						
1430	1500		Myanmar, Radio	5985do					
1430	1500		Netherlands, Radio	9890as	11835as	12075as	15220na		
1445	1500	f	Seychelles, FEBA Radio	11600as					

1500 UTC - 11AM E / 10AM C / 8AM P

1500	1515	Pakistan, Radio	11570me	15100me	15725af	17750af			
1500	1530	Mexico, Radio Mexico Intl	9705am	11770am					
1500	1530	Mongolia, Voice of	12015eu						
1500	1530	S Africa, Channel Africa	17770af						
1500	1559	as	Canada, Radio Canada Intl	15455as	17720as				
1500	1559		Canada, Radio Canada Intl	9515na	13655na	17800na			
1500	1600		Anguilla, Caribbean Beacon	11775am					
1500	1600		Australia, Radio	5995pa	9580pa	11650pa	11650pa		
			11650pa 11660as						
1500	1600		Australia, Voice International	13635as					
1500	1600	vl	Austria, Radio Africa Intl	17895eu					
1500	1600		Canada, CBC Northern Service	9625do					
1500	1600		Canada, CFRX Toronto ON	6070do					
1500	1600		Canada, CFVP Calgary AB	6030do					
1500	1600		Canada, CKZN St John's NF	6160do					
1500	1600		Canada, CKZU Vancouver BC	6160do					
1500	1600		China, China Radio Intl	7160as	9785as	17720as			
1500	1600		China, Voice of Hope	7485as					
1500	1600		Costa Rica, R for Peace Intl	21815va	21815usb				
1500	1600		Costa Rica, University Network	5030am	6150am	7375am	9725sa		
			11870am 13750na 17645as						
1500	1600	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va				

1500	1600	Germany, Deutsche Welle	6140eu						
1500	1600	Germany, Overcomer Ministries	13810af						
1500	1600	a	Germany, Overcomer Ministries	6015af					
1500	1600		Germany, Voice of Hope	15715me					
1500	1600		Guam, TWR	15330as					
1500	1600		Japan, Radio	7200as	9750as	11730as			
1500	1600		Jordan, Radio	11690na					
1500	1600		Myanmar, Radio	5985do					
1500	1600		Netherlands, Radio	9890as	11835as	12075as	15220na		
1500	1600	occasional	New Zealand, Radio NZ Intl	6095pa					
1500	1600		North Korea, Voice of	7505eu	9335na	11335eu	11710na		
1500	1600		Palau, KHBN/VO Hope	9965as	9985as	12160as	13840as		
1500	1600	mtwhfa	Papua New Guinea, NBC	4890do	9675al				
1500	1600		Russia, Voice of Russia	4940me	4965me	4975me	7325me	7390as	
			11500as 11985me						
1500	1600		Singapore, SBC Radio One	6150do					
1500	1600		Sri Lanka, SLBC	4940do	6005as	6075as	9770as	15425as	
1500	1600		UK, BBC World Service	5975am	6190af	6195va	9740as	11685as	
1500	1600		11860af 12095eu	15190va	15310as	15400af	15420af	15565eu	
1500	1600		17700as 17830af	17860af	21470af	21490af			
1500	1600		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb		
			6458usb 10320usb	10940usb	12579usb	12689usb	13362usb		
1500	1600		USA, KAU Dallas TX	13815va					
1500	1600		USA, KJES Vado NM	11715na					
1500	1600		USA, KTBN Salt Lk City UT	15590na					
1500	1600		USA, KWHR Naalehu HI	9930as	11565pa				
1500	1600		USA, Voice of America	6160va	7125va	9590va	9700va	9760va	
			9845va 12040va	15205va	15255va	15550va			
1500	1600		USA, WBQC Kennebunk, ME	17495na					
1500	1600		USA, WEWN Birmingham AL	11550na		11875na	15375na	15745eu	
1500	1600		USA, WHRA Greenbush, ME	17650va					
1500	1600		USA, WHRI Noblesville IN	13760na	15105am				
1500	1600		USA, WINB Red Lion PA	13570am					
1500	1600		USA, WJIE Upton KY	7490am					
1500	1600		USA, WRMI Miami FL	15725am					
1500	1600		USA, WRNO New Orleans LA	7395am	15420am				
1500	1600		USA, WTJC Newport NC	9370na					
1500	1600		USA, WWCN Nashville TN	9475na	12160na	13845na			
			15825na						
1500	1600		USA, WYFR Okeechobee FL	6280as	11830na	15520as			
			17750na						
1515	1545	tw	Seychelles, FEBA Radio	11600as					
1515	1600	mif	Seychelles, FEBA Radio	11600as					
1530	1600		Austria, Radio Austria Intl	17865na					
1530	1600		Iran, VOIRI	7245as	9635eu	11775as			
1530	1600	as	Seychelles, FEBA Radio	11600as					
1540	1550		Turkmenistan, Turkmen Radio	4930as					
1550	1600		Vatican City, Vatican Radio	12065au	13765au	15235au			

1600 UTC - 12PM E / 11AM C / 9AM P

1600	1610		Vatican City, Vatican Radio	12065au	13765au	15235au		
1600	1625		Netherlands, Radio	9890as	11835as	12075as	15220na	
1600	1627		Czech Rep, Radio Prague Intl	5930eu	21745va			
1600	1627		Iran, VOIRI	7245as	9635eu	11775as		
1600	1627		Vietnam, Voice of	7145eu	9730eu			
1600	1630		Israel, Kol Israel	A02 to 10/06/02	15615va	17545va		
1600	1630		Mexico, Radio Mexico Intl	9705am	11770am			
1600	1630		S Africa, Channel Africa	9525af				
1600	1630		USA, KWHR Naalehu HI	9930as				
1600	1640		UAE, Emirates Radio	13630eu	13675eu	15400eu	21597al	
1600	1645		Germany, Deutsche Welle	6140eu	6170as	7225as	9735af	
			11665af 17595as	21840af				
1600	1650	occasional	New Zealand, Radio NZ Intl	6095pa				
1600	1700		Algeria, Radio Algiers Intl	11715eu	15160eu			
1600	1700		Anguilla, Caribbean Beacon	11775am				
1600	1700		Australia, Radio	5995pa	9475as	9580pa	11650pa	11660as
1600	1700		Australia, Voice International	13635as				
1600	1700		Canada, CBC Northern Service	9625do				
1600	1700		Canada, CFRX Toronto ON	6070do				
1600	1700		Canada, CFVP Calgary AB	6030do				
1600	1700		Canada, CKZN St John's NF	6160do				
1600	1700		Canada, CKZU Vancouver BC	6160do				
1600	1700		China, China Radio Intl	7190af	13650af			
1600	1700		Costa Rica, R for Peace Intl	21815va	21815usb			
1600	1700		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na					
1600	1700		Ethiopia, Radio	5990do	7110af	7165af	9560af	9704af
			11800af					
1600	1700	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
1600	1700		France Radio France Intl	11615af	11995af	12015af	15605af	17605af
			17850af					
1600	1700		Germany, Deutsche Welle	6140eu				
1600	1700	a	Germany, Overcomer Ministries	6015af				
1600	1700	a	Greece, Voice of	9420eu	15630eu	17705na		

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1600	1700	Jordan, Radio	11690na						
1600	1700	North Korea, Voice of	9975af	11735af					
1600	1700	Palau, KHBIN/VO Hope	9965as						
1600	1700	Russia, Voice of Russia	7350as	11720as	11985me	12055as			
		15540me							
1600	1700	South Korea, R Korea Intl	5975som	9515af	9870af				
1600	1700	Taiwan, R Taipei Intl	11550as						
1600	1700	UK, BBC World Service	9635af	12095eu					
1600	1700	as UK, BBC World Service	3915as	5975as	6190af	6195va	7160af		
		9410eu	9510as	11860af	12095eu	15190va	15310as		
		15400af	15485eu	15565eu	17830af	17860af	21470af		
		21490af	21660af						
1600	1700	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb			
		6458usb	10320usb	10940usb	12579usb	12689usb	13362usb		
1600	1700	USA, KAU Dallas TX	13815va						
1600	1700	USA, KJES Vado NM	11715na						
1600	1700	USA, KTVN Salt Lk City UT	15590na						
1600	1700	USA, Voice of America	6035af	6160va	7125va	9700va	9760va		
		13600va	13710af	15205va	15225af	15410af	15445va		
		17810af	17895va						
1600	1700	USA, WBCQ Kennebunk, ME	17495na						
1600	1700	USA, WEWN Birmingham AL	11550na	13615na	15375na	15745eu			
1600	1700	USA, WHRA Greenbush ME	17650va						
1600	1700	USA, WHRI Noblesville IN	13760na	15105am					
1600	1700	USA, WINB Red Lion PA	13570am						
1600	1700	USA, WJIE Upton KY	7490am						
1600	1700	USA, WMLK Bethel PA	9465eu						
1600	1700	USA, WRMI Miami FL	15725am						
1600	1700	USA, WRNO New Orleans LA	7395am	15420am					
1600	1700	USA, WSHB Cypress Creek SC	18910af						
1600	1700	USA, WTJC Newport NC	9370na						
1600	1700	USA, WWCN Nashville TN	9475na	12160na	13845na				
		15825na							
1600	1700	USA, WYFR Okeechobee FL	11830na	13855af	15520as				
		17750na	18980eu	21455eu	21525af				
1610	1625	Armenia, TWR	5855eu						
1615	1630	Vatican City, Vatican Radio	15595eu	4005eu	5890eu	7250eu	9645eu		
1630	1700	Georgia, Georgian Radio	6180me						
1630	1700	Guam, AWR	9385me	11850me	15450me				
1630	1700	Slovakia, R Slovakia Intl	5920eu	6055eu	7345eu				
1630	1700	UAE, AWR	9600me						
1630	1700	UK, BBC World Service	11955as	15645eu					
1645	1700	Tajikistan, Radio	7245as						
1650	1700	mtwhf New Zealand, Radio NZ Intl	6095pa						

1700 UTC - 1PM E / 12PM C / 10AM P

1700	1727	Czech Rep, Radio Prague Intl	5930va	21745va					
1700	1730	Azerbaijan, Voice of	6110eu						
1700	1730	France Radio France Intl	15605af	17605af					
1700	1730	S Africa, Channel Africa	17860af						
1700	1759	Poland, Radio Polonia	5995eu						
1700	1800	Anguilla, Caribbean Beacon	11775am						
1700	1800	Australia, Radio	5995pa	9475as	9580pa	9815pa			
		11880pa							
1700	1800	Canada, CBC Northern Service	9625do						
1700	1800	Canada, CFRX Toronto ON	6070do						
1700	1800	Canada, CFVP Calgary AB	6030do						
1700	1800	Canada, CKZN St John's NF	6160do						
1700	1800	Canada, CKZU Vancouver BC	6160do						
1700	1800	China, China Radio Intl	7150af	9570af	9675as	11910af	15205af		
1700	1800	Costa Rica, R for Peace Intl	21815va	21815usb					
1700	1800	Costa Rica, University Network	5030am	6150am	7375am	9725sa			
		11870am	13750na	17645as					
1700	1800	mtwhf Eqt Guinea, Radio Africa	15185af						
1700	1800	a/monthly Finland, Scandv Weekend Radio	6170va	11720va					
1700	1800	a/monthly Finland, Scandv Weekend Radio	6170va	11720va					
1700	1800	Germany, Deutsche Welle	6140eu						
1700	1800	a Germany, Overcomer Ministries	6015af						
1700	1800	Germany, Unt. Methodist Church	11735af	13820af					
1700	1800	vi Italy, IRRS	3985va						
1700	1800	Japan, Radio	9505na	11970eu	15355af				
1700	1800	mtwhf New Zealand, Radio NZ Intl	6095pa						
1700	1800	Romania, R Romania Intl	11740eu	15380eu	15365eu	17805eu			
1700	1800	Russia, Voice of Russia	9745af	9775eu	9890eu	11510af	11985af		
1700	1800	as Russia, Voice of Russia	7360eu	9480eu	11675eu				
1700	1800	Taiwan, R Taipei Intl	11550as						
1700	1800	UK, BBC World Service	3255af	3915af	5975as	6190af	6195eu		
		7160af	7230af	9410eu	9510	9630af	11860af		
		12095eu	15310as	15400af	15420af	17830af	17860af	21470af	
1700	1800	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb			
		6458usb	10320usb	10940usb	12579usb	12689usb	13362usb		
1700	1800	USA, KAU Dallas TX	13815va						
1700	1800	USA, KTVN Salt Lk City UT	15590na						
		USA, Voice of America	6035af	7415af	9760va	9770va	11975af		
		15410af	15580af	17895af					
1700	1800	USA, WBCQ Kennebunk, ME	17495na						
1700	1800	USA, WEWN Birmingham AL	11530na	13615na	15745eu	17595eu			
1700	1800	USA, WHRA Greenbush ME	17650va						
1700	1800	USA, WHRI Noblesville IN	9495am	13760va					

1700	1800	USA, Voice of America	6160va	7125va	7170va	9700va	9645va		
		15205va	15255va	15410af	15445af	17895af			
1700	1800	mtwhf USA, Voice of America	5990va	6045va	7215va	9770va	9785va		
1700	1800	USA, WBCQ Kennebunk, ME	17495na						
1700	1800	USA, WEWN Birmingham AL	11550na	13615na	15745eu	17595eu			
1700	1800	USA, WHRA Greenbush ME	17650va						
1700	1800	USA, WHRI Noblesville IN	9495am	13760va					
1700	1800	USA, WINB Red Lion PA	13570am						
1700	1800	USA, WJIE Upton KY	7490am						
1700	1800	USA, WMLK Bethel PA	15265eu						
1700	1800	USA, WRMI Miami FL	15725am						
1700	1800	USA, WRNO New Orleans LA	7395am	15420am					
1700	1800	USA, WSHB Cypress Creek SC	18910af						
1700	1800	USA, WTJC Newport NC	9370na						
1700	1800	USA, WWCN Nashville TN	9475na	12160na	13845na				
		15815na							
1700	1800	USA, WWRB Manchester TN	9495va	12172va					
1700	1800	USA, WYFR Okeechobee FL	13855af	18980eu	21455eu				
1730	1745	vi Libya, Voice of Africa	Temt A02 to 10/27/02	15435irr	17750irr				
1730	1745	UK, BBC World Service	9525af						
1730	1745	mtwhf/vi UK, United Nations Radio	6125af	15495me	17580af				
1730	1755	Belgium, RVI Flanders R Intl	9925eu	13690eu	13710eu				
1730	1800	ireg Liberia, ELWA	4760do						
1730	1800	vi/mtwhfa Malta, VO Mediterranean	9605eu						
1730	1800	Netherlands, Radio	6020af	7120af	11655af				
1730	1800	Swaziland, TWR	9500af						
1730	1800	mtwhfa Sweden, Radio	6065va	13580va					
1730	1800	Switzerland, Swiss R Intl	15220va	17735va	21720va				
1730	1800	Vatican City, Vatican Radio	13765af	15570af	17515af				
1735	1745	vi/th Paraguay, Radio Nacional	9739sa						
1745	1800	Bangladesh, Bangla Betar	7185eu	9550eu	15520eu				
1745	1800	India, All India Radio	7410eu	11620eu	11935af	13605af	15075af		
		15155af	17670af						

1800 UTC - 2PM E / 1PM C / 11AM P

1800	1827		Vietnam, Voice of	5970eu	7145eu	9725eu	9730eu		
1800	1830	s	Germany, Universal Life/Santec		15750af				
1800	1830	s	Greece, Voice of	9420eu	15630eu		17705na		
1800	1830		Netherlands, Radio	6020af	7120af	11655af			
1800	1830		SAfrica, AWR	5970af	6095af	7170af			
1800	1830		SAfrica, Channel Africa	17860af					
1800	1830		UK, RTE Radio	15315me					
1800	1830	vi	Zimbabwe, ZBC Corp	4828do					
1800	1850	mtwhf	New Zealand, Radio NZ Intl		6095pa				
1800	1900		Anguilla, Caribbean Beacon		11775am				
1800	1900		Australia, Radio	6080pa	7240pa	9475as	9580pa	9815pa	
			11880pa						
1800	1900		Bangladesh, Bangla Betar		7185eu	9550eu	15520eu		
1800	1900		Canada, CBC Northern Service		9625do				
1800	1900		Canada, CFRX Toronto ON		6070do				
1800	1900		Canada, CFVP Calgary AB		6030do				
1800	1900		Canada, CKZN St John's NF		6160do				
1800	1900		Canada, CKZU Vancouver BC		6160do				
1800	1900		Costa Rica, R for Peace Intl		21815va	21815usb			
1800	1900		Costa Rica, University Network		5030am	6150am	7375am	9725sa	
			11870am	13750na	17645as				
1800	1900	mtwhf	Eqt Guinea, Radio Africa		15185af				
1800	1900	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va			
1800	1900		Germany, Deutsche Welle		6140eu				
1800	1900		Germany, Unt. Methodist Church		11735af	13820af			
1800	1900		Germany, Voice of Hope	15715me					
1800	1900		India, All India Radio	7410eu	11620eu	11935af	13605af	15075af	
			15155af	17670af					
1800	1900	vi	Italy, IRRS	3985va					
1800	1900		Kuwait, Radio	11990va					
1800	1900	ireg	Liberia, ELWA	4760do					
1800	1900		Liberia, R Liberia Intl	5100do					
1800	1900		Russia, Voice of Russia	5950eu	7300eu	9480eu	9745af	9775eu	
			9890eu	11510af	11630eu	11675eu	11870af		
1800	1900		Swaziland, TWR		9500af				
1800	1900		Taiwan, R Taipei Intl		3955eu				
1800	1900		UK, BBC World Service	3255af	5975as	6050eu	6190af	6195eu	
			9410eu	9510as	12095eu	15310me	15400af	15420af	17830af
			17885af	21470af					
1800	1900		USA, Armed Forces Network		4319usb	4993usb	5765usb	6350usb	
			6458usb	10320usb	10940usb	12579usb	12689usb	13362usb	
1800	1900		USA, KAU Dallas TX	13815va					
1800	1900		USA, KTVN Salt Lk City UT		15590na				
1800	1900		USA, Voice of America	6035af	7415af	9760va	9770va	11975af	
			15410af	15580af	17895af				
1800	1900		USA, WBCQ Kennebunk, ME		17495na				
1800	1900		USA, WEWN Birmingham AL		11530na	13615na	15745eu	17595eu	
1800	1900		USA, WHRA Greenbush ME		17650va				
1800	1900		USA, WHRN Noblesville IN		9495am	13760va			

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1800	1900	USA, WINB Red Lion PA	13570am			
1800	1900	USA, WJIE Upton KY	7490am			
1800	1900	USA, WMLK Bethel PA	15265eu			
1800	1900	USA, WRMI Miami FL	15725am			
1800	1900	USA, WRNO New Orleans LA	7395am	15420am		
1800	1900	USA, WSHB Cypress Creek SC	15665eu	18910af		
1800	1900	USA, WTJC Newport NC	9370na			
1800	1900	USA, WWCN Nashville TN	9475na	12160na	13845na	
		15815na				
1800	1900	USA, WYFR Okeechobee FL	18980eu			
1800	1900	Yemen, Rep of Yemen Radio	9780me			
1830	1900	Austria, Radio Austria Intl	5945eu	6155eu		
1830	1900	Georgia, Georgian Radio	6230eu			
1830	1900	Georgia, Georgian Radio	11910as			
1830	1900	Greece, Voice of	11645eu			
1830	1900	Greece, Voice of	9420eu	15630eu	17705na	
1830	1900	Netherlands, Radio	6020af	7120af	9895af	11655af
1830	1900	S Africa, AWR	7170af			13700af
1830	1900	Slovakia, R Slovakia Intl	5920eu	6055eu	7345eu	
1830	1900	Turkey, Voice of	9785eu			
1830	1900	UK, RTE Radio	13640na	21630af		
1830	1900	USA, Voice of America	11690af	15525af		
1845	1900	Albania, Radio Tirana Intl	7210na	9520na		
1851	1900	New Zealand, Radio NZ Intl	11725pa			

1900 UTC - 3PM E / 2PM C / 12PM P

1900	1925	Israel, Kol Israel	A02 to 10/06/02	9435va	11605va	15615va
		15640af	17545va			
1900	1927	Vietnam, Voice of	7145eu	9730eu		
1900	1930	Hungary, Radio Budapest	6025eu	7130eu		
1900	1930	Turkey, Voice of	9785eu			
1900	1945	Germany, Deutsche Welle	11805af	11965af	13720af	15390af
		17810af				
1900	1945	India, All India Radio	7410eu	11620eu	11935af	13605af
		15155af	17670af			15075af
1900	1945	Iraq, Radio Iraq Intl	7157irr	9887irr	11787irr	
1900	1945	Zimbabwe, ZBC Corp	4828do	5012do		
1900	1950	New Zealand, Radio NZ Intl	11725pa			
1900	2000	Anguilla, Caribbean Beacon	11775am			
1900	2000	Argentina, RAE	9690eu	15345eu		
1900	2000	Australia, Radio	6080pa	7240pa	9500as	9580pa
		11880pa				9815pa
1900	2000	Botswana, Radio	3356do	4820do	7255do	
1900	2000	Bulgaria, Radio	9400eu	11900eu		
1900	2000	Cameroon, RTV	4850do			
1900	2000	Canada, CBC Northern Service	9625do			
1900	2000	Canada, CFRX Toronto ON	6070do			
1900	2000	Canada, CFVP Calgary AB	6030do			
1900	2000	Canada, CKZN St John's NF	6160do			
1900	2000	Canada, CKZU Vancouver BC	6160do			
1900	2000	China, China Radio Intl	9440af	9585af		
1900	2000	Costa Rica, R for Peace Intl	21815va	21815usb		
1900	2000	Costa Rica, University Network	5030am	6150am	7375am	9725sa
		11870am	13750na	17645as		
1900	2000	Eat Guinea, Radio Africa	15185af			
1900	2000	Finland, Scandv Weekend Radio	6170va	11720va		
1900	2000	Germany, Voice of Hope	15715me			
1900	2000	Ghana, Ghana BC Corp	3366do	4915do		
1900	2000	Guyana, Voice of	3290do	5950do		
1900	2000	Italy, IRRS	3985va			
1900	2000	Kenya, Kenya BC Corp	4885do	4935do		
1900	2000	Kuwait, Radio	11990va			
1900	2000	Liberia, ELWA	4760do			
1900	2000	Liberia, R Liberia Intl	5100do			
1900	2000	Malaysia, Radio	7295do			
1900	2000	Malta, VO Mediterranean	12060eu			
1900	2000	Namibia, NBC	3290do			
1900	2000	Netherlands, Radio	6020af	7120af	9895af	11655af
1900	2000	Nigeria, Radio/Enugu	6025do			13700af
1900	2000	Nigeria, Radio/Ibadan	6050do			
1900	2000	Nigeria, Radio/Kaduna	4770do	6090do	9570do	
1900	2000	Nigeria, Radio/Lagos	3326do	4990af		
1900	2000	Nigeria, Voice of	7255af			
1900	2000	North Korea, Voice of	7505eu	11335eu	11710eu	
1900	2000	Papua New Guinea, NBC	4890do	9675af		
1900	2000	Russia, Voice of Russia	7440eu	9480eu	9775eu	9890eu
		12030eu	12070eu	15735am		11675eu
		Sierra Leone, SLBS	3316do			
1900	2000	South Korea, R Korea Intl	5975om	7275eu		
1900	2000	Thailand, Radio	7155eu			
1900	2000	Uganda, Radio	4976do	5026af	7195af	
1900	2000	UK, BBC World Service	3255af	5975as	6005af	6190af
		9410eu	9630af	11720as	15105af	15310as
		17830af	17885af			15400af

1900	2000	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb
		6458usb	10320usb	10940usb	12579usb	12689usb
1900	2000	USA, KALJ Dallas TX	13815va			
1900	2000	USA, KJES Vado NM	15385au			
1900	2000	USA, KTBN Salt Lk City UT	15590na			
1900	2000	USA, Voice of America	4950af	6035af	6095va	6160va
		7375af	7415af	9525va	9680va	9770va
		13635va	15180va	15410af	15445af	11770va
		15815na			15580af	11975af
1900	2000	USA, WBCQ Kennebunk, ME	17495na			
1900	2000	USA, WEWN Birmingham AL	11550na	13615na	15745eu	17595eu
1900	2000	USA, WHRA Greenbush ME	17650va			
1900	2000	USA, WHRI Noblesville IN	9495am	13760va		
1900	2000	USA, WINB Red Lion PA	13570am			
1900	2000	USA, WJIE Upton KY	7490am			
1900	2000	USA, WMLK Bethel PA	15265eu			
1900	2000	USA, WRMI Miami FL	15725am			
1900	2000	USA, WRNO New Orleans LA	7395am	15420am		
1900	2000	USA, WSHB Cypress Creek SC	15665eu	18910af		
1900	2000	USA, WTJC Newport NC	9370na			
1900	2000	USA, WWCN Nashville TN	9475na	12160na	13845na	
		15815na				
1900	2000	USA, WYFR Okeechobee FL	15775af	18930eu	18980eu	
1900	2000	Vanuatu, Radio	4960do	7260do		
1900	2000	Zambia, Christian Voice	4965af			
1900	2000	Zambia, Radio ZNBC	4910do	6265af		
1930	1955	Belgium, RVI Flanders R Intl	9925eu	13690eu		
1930	2000	Austria, AWR	7130eu			
1930	2000	Belarus, Radio Belarus Intl	7105eu	7210eu		
1930	2000	Georgia, Georgian Radio	11760eu			
1930	2000	Iran, VOIRI	9800eu	11670eu	11855eu	
1930	2000	Poland, Radio Polonia	7165eu	7265eu		
1930	2000	Solomon Islands, SIBC	5020do			
1930	2000	Sweden, Radio	6065va			
1930	2000	Switzerland, Swiss R Intl	13645af	15220af	17580af	17735af
1930	2000	USA, Voice of America	9550va	9840va	11780va	11970va
		13715va	15235va		12015va	
1935	1955	Italy, RAI Intl	5970eu	9745eu		
1950	2000	Vatican City, Vatican Radio	4005eu	5885eu	7250eu	9645eu
1951	2000	New Zealand, Radio NZ Intl	15160pa			

2000 UTC - 4PM E / 3PM C / 1PM P

2000	2010	Vatican City, Vatican Radio	4005eu	5885eu	7250eu	9645af
		9660af	11625af	13765af		
2000	2015	Solomon Islands, SIBC	5020do			
2000	2025	Netherlands, Radio	6020af	7120af	9895af	11655af
2000	2027	Czech Rep, Radio Prague Intl	5930va	11600va		13700af
2000	2027	Iran, VOIRI	9800eu	11670eu	11695af	
2000	2029	Poland, Radio Polonia	7165eu	7265eu	11855eu	
2000	2030	Lithuania, Tomorrow's Nxt Today	7590eu			
2000	2030	Mongolia, Voice of	12015eu			
2000	2030	Solomon Islands, SIBC	5020do			
2000	2030	Switzerland, Swiss R Intl	13645af	15220af	17580af	17735af
2000	2030	USA, Voice of America	4950af	6035af	7375af	7415af
		11975af	15410af	15445af	15580af	17745af
		6140eu				
2000	2045	Germany, Deutsche Welle				
2000	2045	Iraq, Radio Iraq Intl	7157irr	9887irr	11787irr	
2000	2059	Canada, Radio Canada Intl	12015va	15325va	15470va	
		17870va				
2000	2100	Algeria, Radio Algiers Intl	11715eu	15160eu		
2000	2100	Anguilla, Caribbean Beacon	11775am			
2000	2100	Australia, ABC NT Katherine	2485do			
2000	2100	Australia, ABC NT Tennant Crk	2325do			
2000	2100	Australia, Radio	9500as	9580pa	9815pa	11880pa
		12080pa				
2000	2100	Botswana, Radio	3356do	4820do	7255do	
2000	2100	Cameroon, RTV	4850do			
2000	2100	Canada, CBC Northern Service	9625do			
2000	2100	Canada, CFRX Toronto ON	6070do			
2000	2100	Canada, CFVP Calgary AB	6030do			
2000	2100	Canada, CKZN St John's NF	6160do			
2000	2100	Canada, CKZU Vancouver BC	6160do			
2000	2100	China, China Radio Intl	5965eu	9840eu	11640eu	13640af
2000	2100	Costa Rica, R for Peace Intl	21815va	21815usb		
2000	2100	Costa Rica, University Network	5030am	6150am	7375am	9725sa
		11870am	13750na	17645as		
2000	2100	Ecuador, HCJB	17660eu			
2000	2100	Eat Guinea, Radio Africa	15185af			
2000	2100	Finland, Scandv Weekend Radio	5990va	11720va		
2000	2100	Germany, Voice of Hope	15715me			
2000	2100	Ghana, Ghana BC Corp	3366do	4915do		
2000	2100	Indonesia, Voice of	9525pa	11785af	15150as	
2000	2100	Italy, IRRS	3985va			
2000	2100	Kenya, Kenya BC Corp	4885do	4935do		
2000	2100	Kuwait, Radio	11990va			

Shortwave Guide

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2000	2100	irreg	Liberia, ELWA	4760do				
2000	2100		Liberia, R Liberia Intl	5100do				
2000	2100		Malaysia, Radio	7295do				
2000	2100		Namibia, NBC	3290do				
2000	2100		New Zealand, Radio NZ Intl		15160pa			
2000	2100		Nigeria, Radio/Enugu	6025do				
2000	2100		Nigeria, Radio/Ibadan	6050do				
2000	2100		Nigeria, Radio/Kaduna	4770do	6090do	9570do		
2000	2100		Nigeria, Radio/Lagos	3326do	4990al			
2000	2100		Nigeria, Voice of	7255af				
2000	2100		Russia, Voice of Russia	9480eu	9775eu	11675eu	12030eu	12070eu
			15455eu 15735am					
2000	2100		S Africa, AWR	9745af				
2000	2100		Sierra Leone, SLBS	3316do				
2000	2100	mtwhf	Spain, R Exterior Espana	9570af	15290af			
2000	2100		Uganda, Radio	4976do	5026al	7195al		
2000	2100		UK, BBC World Service	3255af	5975ca	6005af	6190af	6195eu
			9410eu 9630af	11835af	11955eu	12095eu	15400af	17830af
2000	2100		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
			6458usb 10320usb	10940usb	12579usb	12689usb	13362usb	
2000	2100		USA, KAUJ Dallas TX	13815va				
2000	2100		USA, KJES Vado NM	15385na				
2000	2100		USA, KTBN Salt Lk City UT		15590na			
2000	2100		USA, Voice of America	6095va	6160va	9770va		
2000	2100		USA, WBCQ Kennebunk, ME		7415na	17495na		
2000	2100		USA, WEWN Birmingham AL		11530na	11550na	13615na	15745eu
			17595eu					
2000	2100		USA, WHRA Greenbush ME		17650va			
2000	2100		USA, WHRI Noblesville IN		5745va	9495am	13760va	
2000	2100		USA, WINB Red Lion PA	13570am				
2000	2100		USA, WJIE Upton KY	7490am				
2000	2100		USA, WMLK Bethel PA	15265eu				
2000	2100		USA, WRMI Miami FL	15725am				
2000	2100		USA, WRNO New Orleans LA		7395am	15420am		
2000	2100		USA, WTJC Newport NC	9370na				
2000	2100		USA, WWCR Nashville TN		9475na	12160na	13845na	
			15815na					
2000	2100		USA, WWRB Manchester TN		9320va	9400va	12172va	
2000	2100		USA, WYFR Okeechobee FL		13855af	15775af	17725sa	17845af
			18980eu					
2000	2100	vi	Vanuatu, Radio	4960do	7260do			
2000	2100		Zambia, Christian Voice	4965af				
2000	2100	vi	Zambia, Radio ZNBC	4910do	6265al			
2000	2100	vi	Zimbabwe, ZBC Corp	5975do	6045al			
2000	2100		USA, WSHB Cypress Creek SC		15665eu	18910af		
2005	2100	vi	Syria, Radio Damascus	12085eu	13610eu			
2010	2030		Vatican City, Vatican Radio		9660af	11625af	13765af	
2025	2045		Italy, RAI Intl	9670af	11880af			
2030	2045	vi	Libya, Voice of Africa	TemitA02 to 10/27/02	15435irr	17750irr		
2030	2045		Thailand, Radio	9680eu				
2030	2057		Vietnam, Voice of	7145eu	9730eu			
2030	2100	t	Belarus, Radio Belarus Intl		7105eu	7210eu		
2030	2100		Cuba, Radio Havana	13660usb	13750eu			
2030	2100		Ecuador, HCJB	21455usb				
2030	2100	vi	Solomon Islands, SIBC	5020do				
2030	2100		Turkey, Voice of	9525as				
2030	2100	f	UK, Wales Radio Intl	7325eu				
2030	2100		USA, Voice of America	6035af	7375af	7415af	11975af	15410af
			15455af 15580af	17745af	17895af			
2030	2100	as	USA, Voice of America	4950af				
2030	2100		Uzbekistan, Radio Tashkent		5025eu	9545eu	11905eu	
2040	2100	mtwhfa	Armenia, Voice of	4810eu	9960eu			
2045	2100		India, All India Radio	7150eu	9650eu	11620eu	11715au	

2100 UTC - 5PM E / 4PM C / 2PM P

2100	2130		Australia, ABC NT Katherine	2485do				
2100	2130		Australia, ABC NT Tennant Crk	2325do				
2100	2130		Australia, Radio	7240pa	9580pa	9660pa		
			11880pa 12080pa	17715pa	21740pa			
2100	2130		Canada, Radio Canada Intl	5850va	7235va	13690va	15325va	
			17870va					
2100	2130		Cuba, Radio Havana	13660usb	13750eu			
2100	2130		Hungary, Radio Budapest		3975eu	6025eu		
2100	2130		Kenya, Kenya BC Corp	4885do	4935do			
2100	2130		Nigeria, Radio/Ibadan	6050do				
2100	2130		South Korea, R Korea Intl		3955eu	15575eu		
2100	2130		Turkey, Voice of	9525as				
2100	2145		Germany, Deutsche Welle		9765as	9770pa	9875af	11865af
			11915as 15135va					
2100	2200		Anguilla, Caribbean Beacon		11775am			
2100	2200		Austria, AWR	15355af				
2100	2200	vi	Botswana, Radio		4820do			
2100	2200		Bulgaria, Radio	9400eu	11900eu			
2100	2200	irreg/vl	Cameroon, RTV	4850do				

2100	2200		Canada, CBC Northern Service	9625do				
2100	2200		Canada, CFRX Toronto ON	6070do				
2100	2200		Canada, CFVP Calgary AB	6030do				
2100	2200		Canada, CKZN St John's NF	6160do				
2100	2200		Canada, CKZU Vancouver BC	6160do				
2100	2200		China, China Radio Intl	5965eu	9840eu	9840eu	11735eu	
			13630af					
2100	2200		Costa Rica, R for Peace Intl		21815va	21815usb		
2100	2200		Costa Rica, University Network		5030am	6150am	7375am	9725sa
			11870am 13750na	17645as				
2100	2200		Ecuador, HCJB	17660eu	21455usb			
2100	2200	mtwhf	Eqt Guinea, Radio Africa		15185af			
2100	2200	f/monthly	Finland, Scandy Weekend Radio		6170va	11690va		
2100	2200	vi	Ghana, Ghana BC Corp		3366do	4915do		
2100	2200		Guyana, Voice of	3290do	5950do			
2100	2200		India, All India Radio	7150eu	9650eu	11620au	11715au	
2100	2200	vi	Italy, IRRS	3985va				
2100	2200		Japan, Radio		6035pa	6055eu	6180eu	11830eu
			11855af 17825na	17860pa	21670pa			
2100	2200	irreg	Liberia, ELWA	4760do				
2100	2200		Liberia, R Liberia Intl	5100do				
2100	2200		Malaysia, Radio	7295do				
2100	2200		Namibia, NBC	3290do				
2100	2200		New Zealand, Radio NZ Intl		15160pa			
2100	2200		New Zealand, Radio NZ Intl		15160pa			
2100	2200		Nigeria, Radio/Enugu	6025do				
2100	2200		Nigeria, Radio/Kaduna	4770do	6090do	9570do		
2100	2200		Nigeria, Radio/Lagos	3326do	4990al			
2100	2200		North Korea, Voice of	7505eu	9335na	11335eu	11710na	
2100	2200		Palau, KHBN/VO Hope	9985as				
2100	2200	mtwhfa	Papua New Guinea, NBC		4890do	9675al		
			Romania, R Romania Intl		9510eu	9725eu	11740eu	
			11940eu					
2100	2200		Sierra Leone, SLBS	3316do				
2100	2200	vi	Solomon Islands, SIBC	5020do				
2100	2200	as	Spain, R Exterior Espana	9570af	9840eu			
2100	2200	vi	Syria, Radio Damascus	12085eu	13610eu			
2100	2200		Taiwan, R Taipei Intl	15600eu				
2100	2200		UK, BBC World Service	3255af	3915as	6005af	6190af	6195eu
			9410eu 11675va	11835af	11945as	12095sa	15400af	
2100	2200		Ukraine, R Ukraine Intl	5905eu	6020eu	9950eu	11705eu	
			11950eu					
2100	2200		USA, Armed Forces Network		4319usb	4993usb	5765usb	
			6350usb 6458usb	10320usb	10940usb	12579usb	12689usb	
			13362usb					
2100	2200		USA, KAUJ Dallas TX	13815va				
2100	2200		USA, KTBN Salt Lk City UT		15590na			
2100	2200		USA, Voice of America	6035af	6040va	6095va	7375af	7415af
			9530va 9705va	9760va	11870va	11975af	13765va	
			15185va 15410af	15455af	15580af	17740va	17820va	
			17895af					
2100	2200		USA, WBCQ Kennebunk, ME		7415na	9355na		
2100	2200		USA, WEWN Birmingham AL		11530na	11550na	13615na	
			17595eu					
2100	2200		USA, WHRA Greenbush ME		17650va			
2100	2200		USA, WHRI Noblesville IN		5745va	9495am	13760va	
2100	2200		USA, WINB Red Lion PA	13570am				
2100	2200		USA, WJIE Upton KY	7490am				
2100	2200		USA, WMLK Bethel PA	15265eu				
2100	2200		USA, WRMI Miami FL	15725am				
2100	2200		USA, WRNO New Orleans LA		7395am	15420am		
2100	2200		USA, WSHB Cypress Creek SC		15665eu	18910af		
2100	2200		USA, WTJC Newport NC	9370na				
2100	2200		USA, WWCR Nashville TN		9475na	12160na	13845na	
			15815na					
2100	2200		USA, WWRB Manchester TN		9320va	9400va	12172va	
2100	2200		USA, WYFR Okeechobee FL		13855na	15120af	17725af	
			17845af 18980eu					
2100	2200	vi	Vanuatu, Radio	4960do	7260do			
2100	2200		Zambia, Christian Voice	4965af				
2100	2200	vi	Zambia, Radio ZNBC	4910do	6265al			
2100	2200	vi	Zimbabwe, ZBC Corp	5975do	6045al			
2130	2157		Czech Rep, Radio Prague Intl		11600va	15545va		
2130	2200	mtwhfa	Albania, Radio Tirana Intl		7130eu	9540eu		
2130	2200		Australia, ABC NT Alice Springs		4835do			
2130	2200		Australia, ABC NT Katherine		5025do			
2130	2200		Australia, ABC NT Tennant Crk		4910do			
2130	2200		Australia, Radio		7240pa	9660pa	11880pa	12080pa
			17715pa 21740pa					
2130	2200	mtwhf	Austria, Radio Austria Intl		5945va	6155eu		
2130	2200		Guam, AWR	11850as	11980as			
2130	2200		Iran, VOIRI	9570as	13655au			
2130	2200		South Korea, R Korea Intl		15575eu			
2130	2200		Sweden, Radio	6065va	15255va			
2130	2200		Uzbekistan, Radio Tashkent		5025eu	9545eu	11905eu	

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2200 UTC - 6PM E / 5PM C / 3PM P

2200	2205	vi	Syria, Radio Damascus	12085eu	13610eu			
2200	2215	vi	Italy, IRRS	3985va				
2200	2215		New Zealand, Radio NZ Intl		15160pa			
2200	2227		Iran, VOIRI	9570as	13655au			
2200	2230		Azerbaijan, Voice of	6110as				
2200	2230		Canada, Radio Canada Intl	6175am	9590am	11920am		
			13670am 15305am	17695am	17880am			
2200	2230		India, All India Radio	7150eu	9650eu	11620au	11715au	
2200	2230	as	USA, Voice of America	5855af	6035af	7375af	7415af	
			11975af					
2200	2230	vi	Zambia, Radio ZNBC	4910do	6265al			
2200	2230	vi	Zimbabwe, ZBC Corp	5975do	6045al			
2200	2300		Anguilla, Caribbean Beacon		6090am			
2200	2300		Australia, ABC NT Alice Springs		4835do			
2200	2300		Australia, ABC NT Katherine		5025do			
2200	2300		Australia, ABC NT Tennant Crk		4910do			
2200	2300		Australia, Radio	13620as	15240as	17715pa	17795va	
			21470pa					
2200	2300	irr/vl	Cameroon, RTV	4850do				
2200	2300		Canada, CBC Northern Service		9625do			
2200	2300		Canada, CFRX Toronto ON		6070do			
2200	2300		Canada, CFVP Calgary AB		6030do			
2200	2300		Canada, CKZN St John's NF		6160do			
2200	2300		Canada, CKZU Vancouver BC		6160do			
2200	2300		China, China Radio Intl	7170eu				
2200	2300		Costa Rica, R for Peace Intl		15050va	21815usb		
2200	2300		Costa Rica, University Network		5030am	6150am	7375am	9725sa
			11870am 13750na	17645as				
2200	2300	mtwhf	Eat Guinea, Radio Africa		15185af			
2200	2300	f/monthly	Finland, Scandv Weekend Radio		6170va	11690va		
2200	2300	vi	Ghana, Ghana BC Corp		3366do	4915do		
2200	2300		Guyana, Voice of		3290do			
2200	2300	vl/fas	Italy, IRRS	7120va				
2200	2300		Liberia, R Liberia Intl		5100do			
2200	2300		Malaysia, Radio		7295do			
2200	2300		Namibia, NBC		3290do			
2200	2300		Nigeria, Radio/Enugu		6025do			
2200	2300		Nigeria, Radio/Kaduna		4770do	6090do	9570do	
2200	2300		Nigeria, Radio/Lagos		3326do	4990al		
2200	2300		Palau, KHBN/VO Hope		9965as	9985as		
2200	2300		Sierra Leone, SLBS		3316do			
2200	2300	vi	Solomon Islands, SIBC		5020do			
2200	2300		Taiwan, R Taipei Intl		15600eu			
2200	2300		Turkey, Voice of		11960va	12000va		
2200	2300		UK, BBC World Service		3915as	5965as	5975am	6195as
			9580eu 9740as	11685as	11945as	11955as	12095af	7105as
			15390ca 15400af					
2200	2300		USA, Armed Forces Network		4319usb	4993usb	5765usb	
			6350usb 6458usb	10320usb	10940usb	12579usb	12689usb	
			13362usb					
2200	2300		USA, KAU Dallas TX		13815va			
2200	2300		USA, KTBN Salt Lk City UT		15590na			
2200	2300		USA, KWHR Naalehu HI		17510as			
2200	2300		USA, Voice of America		7215va	9705va	9770va	11760va
			13765va 15185va	15290va	15305va	17740va	17820va	
2200	2300		USA, WBCQ Kennebunk, ME		7415na	9355na		
2200	2300		USA, WEWN Birmingham AL		9975eu	11530na	11550na	
			15745eu 17595eu					
2200	2300		USA, WHRA Greenbush ME		7580eu	17650af		
2200	2300		USA, WHRI Noblesville IN		5745va	9495am	13760va	
2200	2300		USA, WINB Red Lion PA		13570am			
2200	2300		USA, WJIE Upton KY		7490am			
2200	2300		USA, WRMI Miami FL		15725am			
2200	2300		USA, WRNO New Orleans LA		7395am	15420am		
2200	2300		USA, WSHB Cypress Creek SC		13770eu	15285sa		
2200	2300		USA, WTJC Newport NC		9370na			
2200	2300		USA, WWCN Nashville TN		13845na	7465na	9475na	12160na
2200	2300		USA, WWRB Manchester TN		12172va	6890va	9320va	9400va
			17845af			11740na	15695af	15695af
2200	2300	vi	Vanuatu, Radio		4960do	7260do		
2200	2300		Zambia, Christian Voice		4965af			
2205	2230		Italy, RAI Intl		11900as	15625as		
2216	2300		New Zealand, Radio NZ Intl		17675pa			
2230	2255		Belgium, RVI Flanders R Intl		15565na			
2230	2257		Czech Rep, Radio Prague Intl		11600na	15545na		
2230	2300		Canada, Radio Canada Intl		6175na	9590na	13670na	
			17695na					
2230	2300		Cuba, Radio Havana		9550am			
2245	2300		India, All India Radio		9705as	9950as	11620as	13605as

2300 UTC - 7PM E / 6PM C / 4PM P

2300	0000		Anguilla, Caribbean Beacon		6090am			
2300	0000		Australia, ABC NT Alice Springs		4835do			
2300	0000		Australia, ABC NT Katherine		5025do			
2300	0000		Australia, ABC NT Tennant Crk		4910do			
2300	0000		Australia, Radio		9660pa	12080pa	13620as	15240as
			17715pa 17795pa	21740pa				
2300	0000		Bulgaria, Radio		9400na	11700na		
2300	0000	irr/vl	Cameroon, RTV		4850do			
2300	0000		Canada, CBC Northern Service		9625do			
2300	0000		Canada, CFRX Toronto ON		6070do			
2300	0000		Canada, CFVP Calgary AB		6030do			
2300	0000		Canada, CKZN St John's NF		6160do			
2300	0000		Canada, CKZU Vancouver BC		6160do			
2300	0000		China, China Radio Intl		5990na	13680na		
2300	0000		Costa Rica, R for Peace Intl		15050va	21815usb		
2300	0000		Costa Rica, University Network		5030am	6150am	7375am	9725sa
			11870am 13750na	17645as				
2300	0000		Egypt, Radio Cairo		9900na			
2300	0000	f/monthly	Finland, Scandv Weekend Radio		5980va	11690va		
2300	0000	vi	Ghana, Ghana BC Corp		3366do	4915do		
2300	0000		Guyana, Voice of		3290do	5950do		
2300	0000		India, All India Radio		9705as	9950as	11620as	13605as
2300	0000		Liberia, R Liberia Intl		5100do			
2300	0000		Malaysia, Radio		7295do			
2300	0000		Namibia, NBC		3290do			
2300	0000		New Zealand, Radio NZ Intl		17675pa			
2300	0000		Palau, KHBN/VO Hope		9965as	9985as		
2300	0000		Romania, R Romania Intl		9570eu	11740na	11775na	
			15105na					
2300	0000		Sierra Leone, SLBS		3316do			
2300	0000		Singapore, SBC Radio One		6150do			
2300	0000		Sri Lanka, SLBC		4940do			
2300	0000		UK, BBC World Service		3915as	5965as	5975am	6195as
2300	0000		9580eu 9740as	11685as	11945as	11955as	12095af	15390ca
			15400af					
2300	0000		USA, Armed Forces Network		4319usb	4993usb	5765usb	6350usb
			6458usb 10320usb	10940usb	12579usb	12689usb	13362usb	
2300	0000		USA, KAU Dallas TX		13815va			
2300	0000		USA, KTBN Salt Lk City UT		15590na			
2300	0000		USA, KWHR Naalehu HI		17510as			
2300	0000		USA, Voice of America		7215va	9705va	9770va	11760va
2300	0000		15185va 15290va	15305va	17740va	17820va		
2300	0000		USA, WBCQ Kennebunk, ME		7415na	9355na		
2300	0000		USA, WEWN Birmingham AL		9355na	9975eu	15745na	17595eu
2300	0000		USA, WHRA Greenbush ME		7580eu			
2300	0000		USA, WHRI Noblesville IN		5745va	9495am	13760va	
2300	0000		USA, WINB Red Lion PA		13570am			
2300	0000		USA, WJIE Upton KY		7490am			
2300	0000	smtwhf	USA, WRMI Miami FL		7385am			
2300	0000		USA, WRMI Miami FL		9955am			
2300	0000		USA, WRNO New Orleans LA		7355am			
2300	0000		USA, WSHB Cypress Creek SC		13770eu	15285sa		
2300	0000		USA, WTJC Newport NC		9370na			
2300	0000as		USA, WWBS Macon GA		11900na			
2300	0000		USA, WWCN Nashville TN		13845na	5070na	7465na	9475na
2300	0000		USA, WWRB Manchester TN		12172va	6890va	9320va	9400va
2300	0000		USA, WYFR Okeechobee FL		17750sa	5895sa	11740na	11855sa
			17750sa					
2300	0000	vi	Vanuatu, Radio		4960do	7260do		
2300	0000	vi	Vanuatu, Radio		4960do	7260do		
2300	0000		Zambia, Christian Voice		4965af			
2300	2230		Mexico, Radio Mexico Intl			9705am	11770am	
2300	2330		Cuba, Radio Havana		9550am			
2300	2330		Nigeria, Radio/Enugu		6025do			
2300	2330		Nigeria, Radio/Kaduna		4770do	6090do		
2300	2330		Nigeria, Radio/Lagos		3326do	4990al		
2300	2330	vi	Solomon Islands, SIBC		5020do			
2300	2330		USA, Voice of America		7190va	7200va	9545va	11925va
2300	2345		Germany, Deutsche Welle		9815as	12000as	17560as	21790as
2303	2310		Croatia, Croatian Radio		9925na			
2330	0000		Canada, Radio Canada Intl		17695na	6175na	9590na	13670na
2330	0000		Lithuania, R Vilnius		9875eu			
2330	0000		Netherlands, Radio		6165na	9845na		
2330	0000	a	Russia, Radio Ezra		17665na			
2330	0000		Switzerland, Swiss R Intl		9885sa	11905sa		
2330	0000		USA, Voice of America		7190va	7200va	7225va	7260va
			11805va 11925va	13735va	13775va	15205va	9545va	
2330	2345	vi	Libya, Voice of Africa		15435irr			
2330	2357		Vietnam, Voice of		9840as	12020as		
2345	0000	vi	Pakistan, Radio		11580as	15455as		



Notes:

1. **BBCWS stream abbreviations:** (am)=Americas; (eu)=Europe/N. Africa; (me)=Middle East, SW Asia, CIS (former Soviet Union); (wcaf)=West and Central Africa; (esaf)=East and Southern Africa; (af)=both (wcaf) and (esaf); (sas)=South Asia; (eas)=East Asia.
2. Frequencies, reported audible in North America, are provided with the listings for the various BBC streams, and also for the U.S. based independent shortwave stations, to assist listeners in determining which program streams are carried on which frequencies. For frequencies for all other stations, refer to MT's frequency listings in this SWG.
3. Listings for the U.S. based independent shortwave stations include only those programs that depart from their primary formats of political and religious fare.
4. Listings for **VOA News Now** and *Special English* broadcasts to the Western Hemisphere are included below. For the full **VOA** program schedule, please refer to June's Highlights column.
5. An even more comprehensive schedule of programs broadcast globally on shortwave is available from my *WWW Shortwave Listening Guide* web site, hosted by NASWA and located at <www.anarc.org/naswa/swguide>.
6. Corrections and updates to these schedules FROM YOU via postal mail and e-mail are welcomed and much appreciated and will be credited!

0000 UTC/ 8pm E/5pm P - Page 43 Freqs

BBC WORLD SERVICE (am) - 5975, 11835, 12095

0000 S/M World Briefing, T-A News; 0005 T Meridian-Masterpiece, W Meridian-Screen, H Meridian-Writing, F The Music Biz, A Arts in Action; 0020 S/M Sports Roundup; 0030 S Agenda, M The World Today, T Charlie Gillett, W UK Top 20, H Revolver, F John Peel, A Jazzmatazz.

BBC WORLD SERVICE (eas) - 15280, 15360

0000 D World Briefing; 0020 D Sports Roundup; 0030 S Agenda, M World Business Review, T-A World Business Report; 0045 M Letter from America, TWFA Analysis, H From Our Own Correspondent.

RADIO AUSTRALIA

0000 D News; 0005 S The Europeans, A Feedback (letters/station news); 0010 M AWAYE! (Aboriginal culture), T The Science Show, W The National Interest (Australian politics), H Background Briefing (documentary), F Hindsight (Australian history); 0030 A Country Breakfast (rural life); 0034 S Ockham's Razor (a science issue).

RADIO JAPAN

0000 D News; 0010 S Hello from Tokyo (listener contact), M Weekend Square; 0015 T-A 44 Minutes (feature magazine).

RADIO NETHERLANDS

0000 S/W Music 52-15 (international music), M Dutch Horizons, T Research File (science), H Documentary, F Aural Tapestry (cultural magazine), A A Good Life (global development); 0030 S Roughly Speaking (Euro youth culture), M Aural Tapestry, T EuroQuest (Europe in context), W A Good Life, H Dutch Horizons, F Research File, A Documentary.

RADIO NEW ZEALAND INT.

0000 S/A News; M-F Midday Report; 0012 S This Week in Parliament, A Focus on Politics; 0033 S Spectrum (life in NZ), A The Sampler (latest CDs).

RADIO FOR PEACE INT., Costa Rica

0000 S World of Radio, M Spiritual Awakening, T-A Freespeech Radio News; 0030 S RFP Mailbag, M One World—One Family (Bahai program), T/H/A Hightower Radio (commentary), W Radio Nation ("The Nation"), F This Way Out (gays magazine); 0035 T/H/A Earthwatch (ecology); 0040 T/H/A Earth & Sky (astronomy); 0045 T Tropical Conservation News Bureau (rainforests), H World Citizen's Weekly Commentary, A Women (UN program).

RADIO PRAGUE

0000 D News; 0005 S Readings from Czech Literature, M Letter from Prague, T-A Newsview; 0010 S Saturday Music (classical/folk/jazz), M The Arts, W Witness, H ABC of Czech; 0015 M Mailbox, T One on One (interview), W Talking Point or Insight Central Europe, H Czechs in History or Profile, F Economic Report, A Magazine.

RADIO UKRAINE INT.

0000 D News; 0006 M Hello From Kiev (listener letters/music); 0010 T-S Ukraine Today (magazine); 0018 S Baroque (the arts); 0020 M Music from Ukraine; 0025 T-F Closeup (current issues).

SPANISH FOREIGN RADIO

0000 S Visitors' Book, M Window on Spain (culture/arts), T-A News; 0016 S/M repeat of weekday feature programs, T-A Spanish pop music; 0020 T-A Press Review; 0025 Feature programs (including "Radio Waves" for DXers, "Chronicles" on Spain's foreign relations, "Entremeses" on food and travel, "Africa Today" and "Radio Club", a mailbag program); 0040 S Radio Waves (for hobbyists), M Radio Club (listener contact), T-A Spanish Language Lesson.

VOICE OF AMERICA (News Now)

0000 T-A News; 0015 T-A Focus; 0023 T-A Sports; 0030 T-A Headlines; 0033 T-A Coast to Coast (American magazine).

WBCQ, Maine

7415 kHz.: 0000 S Different Kind of Oldies Show, M Radio New York International (to 0400), W Off the Hook, A Allan Weiner Worldwide.
9335 kHz.: 0000 S American Bizarre.

WHRI, Indiana

7580 kHz.: 0000 M 20, The Countdown Magazine (to 0200).

WWCR, Tennessee

3210 kHz.: 0000 S The Big Backyard (Australian country music).

YLE, Radio Finland

0000 S Capital Weekend (magazine).

0100 UTC/ 9pm E/6pm P - Page 43 Freqs

BBC WORLD SERVICE (am) - 5975, 11835, 12095

0100 S The World Today, M-A News; 0105 M Wright Around the World (musical variety), T Health Matters, W Go Digital, H Discovery, F One Planet (ecology), A Science in Action; 0130 S Music Review, T Everywoman, W Omnibus (documentary), H Sports International, F People & Places, A Essential Guide.

BBC WORLD SERVICE (me) - 9410

0100 S The World Today, M-A News; 0105 M Wright Around the World (musical variety), T Health Matters, W Go Digital, H Discovery, F One Planet (ecology), A Science in Action; 0130 S World Business Review, T Everywoman, W Omnibus (documentary), H Sports International, F People & Places, A Essential Guide; 0145 S Letter from America (Alistair Cooke).

BBC WORLD SERVICE (eas) - 15280, 15360

0100 S The World Today, M-A News; 0105 M Talking Point, T-A Outlook (magazine); 0145 M-F Off the Shelf (serialized readings), A Patterns of Faith (belief systems).

CHINA RADIO INT.

0100 D News; 0110 S Report on Developing Countries, M-F Current Affairs, A Biz China; 0120 S In the Spotlight (cultural magazine), A Cutting Edge (sci/tech); 0130 M People in the Know (China's leading citizens), T Sports World, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

DEUTSCHE WELLE

0100 D News; 0105 S Talking Point (journalists), M Religion & Society, T-A Newslink (European current affairs); 0115 S Inside Europe, M Arts on the Air; 0130 T Insight (international affairs), W Man & Environment, H Living in Germany, F Hard to Beat: The World of Sport, A German by Radio.

HCB, Ecuador

0100 S DX Partyline, M Musical Mailbag, T-A Latin American & World News; 0110 T-A Studio 9 (Latin American regional report including T Insight HCB, W/F Did You Hear? (news comment), H Ham Radio Today, A Musica del Ecuador); 0130 S Saludos Amigos, M Mountain Meditations, T-A A New Beginning; 0145 T-A A Time for Truth.

RADIO AUSTRALIA

0100 D News; 0105 S In Conversation, A Asia Pacific (regional current affairs); 0110 M-F Asia Pacific; 0130 S Oz Sounds (new releases), M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor, A RA Arts.

RADIO AUSTRIA INT.

0130 D Report from Austria (magazine); 0135 S Insight Central Europe, M Network Europe; 0150 S Listener Letters.

Radio Budapest

0100 D News; 0110 S Insight Central Europe; M Europe Unlimited (trade) or Heading for Hungary (travel) or Spotlight (culture) or And the Gatepost (letters), T-A Hungary Today (current events magazine); 0120 A DX Corner.

RADIO CANADA INT.

0100 D News; 0105 S Business Sense, M Maple Leaf Mailbag (w/CIDX report bimonthly); 0110 T-A Canada Today (current events magazine); 0135 S/A Canada in the World, M/H Spotlight (arts & culture), T Media Zone (journalists discuss), W Maple Leaf Mailbag (w/CIDX report bimonthly), F Business Sense.

RADIO HABANA CUBA

0100 D International News; 0110 M Weekly Review, T-S National News; 0115 T-S Viewpoint; 0130 M Reports & Music, T-S News Bulletin; 0135 T-A Time Out (sports); 0140 S/W DXers Unlimited, M Mailbag Show, T/H/F Caribbean Outlook, A Weekly Review; 0150 M Breakthrough (science report).

RADIO NETHERLANDS

0100 S/M News, T-A Newslines; 0105 S Europe Unzipped, M Wide Angle (week in review).

RADIO NEW ZEALAND INT.

0100 D RNZ News; 0106 S At the Movies, M-F Cadenza (light classics), A Your Money; 0130 S Bookmarks, A The Lord of the Rings (serialized reading in 26 parts).

RADIO FOR PEACE INT., Costa Rica

0100 S Making Contact, M Every Living Thing (nature), T Disability Radio Worldwide, W World of Radio, H A Public Affair, F Far Right Radio Review, A Continent of Media; 0130 S Alternative Radio (political/social analysis), T This Way Out (gays magazine), W RFP Mailbag, A World of Radio.

RADIO PRAGUE

0100 D News; 0105 S Readings from Czech Literature, M Letter from Prague, T-A Newsview; 0110 S Saturday Music (classical/folk/jazz), M The Arts, W Witness, H ABC of Czech; 0115 M Mailbox, T One on One (interview), W Talking Point or Insight Central Europe, H Czechs in History or Profile, F Economic Report, A Magazine.

RADIO SLOVAKIA INT.

0100 M Sunday Newsreel, T-S News; 0105 S Insight Central Europe, T-A Topical Issue; 0110 M Listeners Tribune (letters/Slovak music), T Tourism and Local Life, W Sport, H Business, F Culture, A History.

RTE, Ireland

0130 S/M Sportsnews; T-A The News at Six.

VOICE OF AMERICA (News Now)

0100 T-A News; 0110 T-A Analysis; 0123 T-A Sports; 0130 T-A Headlines; 0133 T-F Business Report, AVOA News Review; 0145 T-F Dateline (news magazine); 0155 T-A Editorial.

VOICE OF AMERICA (Special English)

0130 T-A News; 0140 T Agriculture Today, W/H Science Report, F Environment Report, A In the News; 0145 T Science in the News, W Explorations, H Making of a Nation, F American Mosaic; A American Stories.

VOICE OF RUSSIA

0100 D News; 0111 S News & Views, M Sunday Panorama, T-A Commonwealth Update; 0124 M Russia: People & Events; 0130 D News in Brief; 0132 S Moscow Yesterday & Today, M Timelines, T Folk Box, W Jazz Show, H Musical Portraits of the 20th Century, F Yours for the Asking, A Christian Message from Moscow; 0146 F Music At Your Request; 0154 H Russia: People & Events.

VOICE OF VIETNAM

0100 D News; 0105 D Current Affairs; 0110 Su Weekly Review, M Sunday Show, T/W/F/A Press Review, H Talk of the Week; 0115 T Vietnam: Land & People, W Culture & Society, H Letterbox, F Vietnam Economy, A Rural Vietnam; 0120 S Music, A Literature and Arts.

WBCQ, Maine

7415 kHz.: 0100 S Marion's Attic (vintage recordings), M Radio New York International (from 0000), F Tasha Takes Control.

WHRI, Indiana

7580 kHz.: 0105 S Music (Christian contemporary/gospel), M 20, The Countdown Magazine (from 0100).

WWCR, Tennessee

5070 kHz.: 0145 S Ask WWCR (letters).

0200 UTC/ 10pm E/7pm P - Page 44 Freqs

BBC WORLD SERVICE (am) - 5975, 11835

Shortwave Guide



0200 D The World Today; **0230** S World Business Review, M Assignment, T-A World Business Report; **0245** S Letter from America, T/W/F/A Analysis, H From Our Own Correspondent.

BBC WORLD SERVICE (me) - 6195, 9410, 12095

0200 D The World Today; **0230** S From Our Own Correspondent, A Global Business.

BBC WORLD SERVICE (eas) - 15280, 15360

0200 S/A The World Today, M-F News; **0205** M Meridian-Masterpiece, T Meridian-Screen, W Meridian-Writing, H The Music Biz, F Arts in Action; **0230** S From Our Own Correspondent, M Charlie Gillett (world music), T UK Top 20, W Revolver, H John Peel (eclectic music), F Jazzmatazz, A Music Review.

HCB, Ecuador

0200 S Rock Solid, M Hour of Decision, T-A Insight for Living; **0228** T-A Money Minute; **0230** M Renewing Your Mind, T-A Back to the Bible; **0255** T-A Joni and Friends.

RADIO AUSTRALIA

0200 D News; **0205** S Margaret Throsby (interviews and music), A Background Briefing (documentary); **0210** M-F The World Today (ABC Radio flagship news program).

[Special service: **0205** S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO BUDAPEST

0230 D News; **0240** S Insight Central Europe; M Europe Unlimited (trade) or Heading for Hungary (travel) or Spotlight (culture) or And the Gatepost (letters), T-A Hungary Today (current events magazine); **0250** A DX Corner.

RADIO BULGARIA

0200 D News; **0210** S Views Behind the News, M Folk Studio (Bulgarian folk music), T-A Events and Developments; **0220** T Sports; **0225** W-S Timeout for Music; **0230** T Bulgarian Plaza (cultural magazine) or Walks and Talks (interesting places); **0235** T Answering Your Letters, W-M Keyword Bulgaria (Bulgaria and things Bulgarian); **0245** S Radio Bulgaria Calling (for radio hobbyists), W Magazine Economy, H Arts and Artists, F History Club, A The Way We Live.

RADIO HABANA CUBA

0200 D International News; **0210** M From Habana (Cuban musicians), T-S National News; **0215** T-S Reports and music; **0230** M The Jazz Place or Top Tens, T-S News Bulletin; **0235** S World of Stamps, T-A Reports and music; **0250** S Cuban music.

RADIO KOREA INT.

0200 D News; **0210** S Seoul Report (week in review), M Korean Pop Interactive (requests), T-A News Commentary; **0215** T-A Seoul Calling (magazine); **0230** S From Us to You (letters), M Multiwave Feedback (letters/DX news), T Exploring the New Millennium, W Cultural Promenade, H Economic Radar, F Korea & Its Splendors, A Notes of Nostalgia (traditional music).

RADIO NEW ZEALAND INT.

0200 D RNZ News; **0205** S Feature program/series*, M-F In Touch with New Zealand (music/variety), A Eureka! (science)*; **0230** A Health Matters or Environment Matters*.

[* may be preempted by live sport].

RADIO FOR PEACE INT., Costa Rica

0200 S Alternative Radio (from 0130), M New Dimensions, T University Forum (interviews), W Continent of Media, H WINGS (women's news), F Disability Radio Worldwide, A RFP1 Mailbag; **0230** S Far Right Radio Review, T Honoring Mother Earth: Indigenous Voices, W Earthspan (War & Peace Foundation), H Global Community Forum (interviews), F A Woman's Voice, A University Forum (peace studies).

RADIO ROMANIA INT.

0200 D Radio Newsreel; **0210** S The Week, M Focus, T-A Commentary; **0215** S World of Culture, M Sunday Studio, T Pro Memoria (history), W Business Club, H Society Today, F Cards on the Table (debate) or The Romanian Next to You (interview), A Challenge for the Future or Terra 2001; **0220** S RRI Encyclopedia, T Political Flash, W European Horizons; **0225** S Roots (culture/traditions), M Romanian by Radio, T/H/A Business Update, W Tourist News, F Listeners' Letterbox; **0230** S Radio Pictures, M Romanian Itineraries, T Pulse of Transition, W W Mother Nature (ecology), H Visit Romania, A Practical Guide; **0235** S Romanian Itineraries, M Listeners' Letterbox, T Performing Arts, W Youth Club, H Partners in a Changing World, A Cultural Survey; **0240** S, Bucharest Along the Centuries, T Pages of Romanian Literature, W/F Skylark (folk music), H Stage and Screen, A Spectorator (voice of the people); **0245** S DX Mailbag, T Romanian Hits, H Romanian Musicians, A Romanian Folk Music At Its Best; **0250** M Romanian Folk Music At Its Best, T Sports Roundup, W Athlete of the Week, H Sports Club,

F Football Flash, A Sports Weekend.

RADIO SWEDEN

0230 S Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th), M In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), T-A Sixty Degrees North (regional report); **0245** T Sports Scan, W Close Up (profiles of Swedes-1st/3rd), H Money Matters, F Nordic Report (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), A Review of the Newsweek.

Radio Taipei Int.

0200 D News; **0215** S Great Wall Forum (discussing the mainland), M Jade Bells & Bamboo Pipes (traditional music), T Culture Express, W Taiwan Today, H Discover Taiwan, F Taipei Magazine, A Groove Zone; **0230** S Mailbag Time, T Trends, W Confucius and Inspiration Beyond, H Life Unusual, F People; **0245** M-F Let's Learn Chinese (M/W/F elementary, T/H intermediate), A Kaleidoscope (life in Taiwan).

[This schedule also airs at 0700 for western North America.]

VOICE OF RUSSIA

0200 D News; **0211** S/W/H Moscow Mailbag, T/F Science & Engineering, W/A Newmarket (business); **0230** D News in Brief; **0232** S Songs from Russia, M This is Russia, T Kaleidoscope (Russian events), W Musical Portraits of the 20th Century, H Moscow Yesterday & Today, F Russian by Radio, A Audio Book Club (Russian lit.); **0246** S You Write to Moscow; **0254** W Russia: People & Events.

VOICE OF VIETNAM

0230 D News; **0235** D Current Affairs; **0240** Su Weekly Review, M Sunday Show, T/W/F/A Press Review, H Talk of the Week; **0245** T Vietnam: Land & People, W Culture & Society, H Letterbox, F Vietnam Economy, A Rural Vietnam; **0250** S Music, A Literature and Arts.

WBCQ, Maine

7415 kHz: **0200** S Pocket Calculator, M Radio New York International (from 0000).

WHRI, Indiana

7580 kHz: **0205** M Music (Christian contemporary/gospel); **0230** S DXing with Cumbre, A World Harvest Country Style.

WRMI, Florida

7385 kHz: **0230** S Drive In Double Feature, M Wavescan.

WWCR, Tennessee

3210 kHz: **0205** M Golden Age of Radio Theatre.
5070 kHz: **0230** S World of Radio.

0300 UTC/ 11pm E/8pm P - Page 44 Freqs

BBC WORLD SERVICE (am) - 5975, 11835

0300 S/M World Briefing, T-A News; **0305** T Jazzmatazz, W Charlie Gillett, H John Peel, F Composer of the Month, A The Hitch-Hiker's Guide to the Galaxy; **0320** S/M Sports Roundup; **0330** S Reporting Religion, M Westway Omnibus (drama serial), T/F World Learning Features, W Write On, H Heart & Soul (religion), A Patterns of Faith; **0345** T-A Off the Shelf (book readings).

BBC WORLD SERVICE (eu) - 6195, 9410

[same as (am) schedule above]

BBC WORLD SERVICE (me) - 12095, 15575

0300 D World Briefing; **0320** D Sports Roundup; **0330** S Reporting Religion, M World Business Review, T-A World Business Report; **0345** M Patterns of Faith, T/W/F/A Analysis, H From Our Own Correspondent.

BBC WORLD SERVICE (af) - 6005, 7120, 7160, 11730, 12035, 15420

0300 D World Briefing; **0320** D Sports Roundup; **0330** S Postmark Africa, M-F Network Africa, A African Quiz or This Week And Africa.

BBC WORLD SERVICE (eas) - 15280, 15360

0300 S World Briefing, M-A News; **0305** M One Planet (ecology), T Science in Action, W Health Matters, H Go Digital, F Discovery, A Wright Around the World (music requests); **0320** S Sports Roundup; **0330** S Reporting Religion, M People and Places, T Essential Guide, W Everywoman, H Omnibus (documentary), F Sports International.

CHINA RADIO INT.

0300 D News; **0310** S Report on Developing Countries, M-F Current Affairs, A Biz China; **0320** S In the Spotlight (cultural magazine), A Cutting Edge (sci/tech); **0330** M People in the Know (China's leading citizens), T Sports World, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A

Listeners' Garden.

DEUTSCHE WELLE

0300 D News; **0305** S Saturday Review, M Sunday Review, T-A Newslink (European current affairs); **0315** S Spectrum (sci/tech), M Arts on the Air; **0330** T Insight (international affairs), W Man & Environment, H Living in Germany, F Hard to Beat: The World of Sport, A German by Radio.

HCB, Ecuador

0300 S Inspirational Classics (liturgical classical music), M The Sower, T-A Stories of Great Christians; **0315** M The Word Today, T-A Rendezvous (inspirational music); **0330** S Did You Hear (news comment), M Unshackled (radio's oldest drama series), T Let My People Think (apologetics), W Words for Women, H Adventures in Odyssey (children), F Book & the Spade (religion & archaeology), A Walkin' in the Sunshine (country music); **0345** S Specialized English, W Wonderful Words of Life (hymns), F Science, Scripture & Salvation.

RADIO AUSTRALIA

0300 D News; **0305** S Feedback (letters/station news), A Rural Reporter; **0310** M-F Regional Sports Report; **0320** M-F Pacific Focus (M business, T health, W environment, H sport, F culture); **0330** S All in the Mind (the brain), A Educational series; **0340** M Oz Music Show (rock), T Music Deli (diverse world/folk), W Blacktracker (contemporary Aboriginal), H Australian Country Style, F Jazz Notes.

[Special service: **0305** S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO HABANA CUBA

0300 D International News; **0310** M Weekly Review, T-S National News; **0315** T-S Viewpoint; **0330** M Reports & Music, T-S News Bulletin; **0335** T-A Time Out (sports); **0340** S/W DXers Unlimited, M Mailbag Show, T/H/F Caribbean Outlook, A Weekly Review; **0350** M Breakthrough (science report).

RADIO NEW ZEALAND INT.

0300 S/A RNZ News*, M-F Pacific Regional News; **0305** S Feature program or series*, A The Mix* (rock music); **0308** M Tagata o te Moana (Pacific culture), T Top 5, W Pacific Report, H Mailbox (letters & DX news) or RNZI Talk (meet the RNZI staff), F Dateline Pacific; **0330** T New Releases, W Tradewinds, H The World in Sport, F Pacific Correspondent; **0335** S Band Programme*. [* may be preempted by live sport].

RADIO FOR PEACE INT., Costa Rica

0300 S Far Right Radio Review (from 0230), M Voices of Our World (Maryknoll program), T Honoring Mother Earth: Indigenous Voices (from 0230), W Living Enrichment Center, H Global Community Forum (from 0230), F A Woman's Voice (from 0230), A Earthspan (War & Peace Foundation); **0330** S World Citizens Weekly Commentary, M Perspective (UN program), T In the Moment, W Peace Forum, H Scope (UN program), F Tropical Conservation Newshour (rainforests), A Newmaier Report; **0345** S/M Hightower Report (commentary), T-A UN Today; **0350** S/M Earthwatch (ecology); **0355** S/M Earth & Sky (astronomy).

RADIO PRAGUE

0300 D News; **0305** S Readings from Czech Literature, M Letter from Prague, T-A Newsweek; **0310** S Saturday Music (classical/folk/jazz), M The Arts, W Witness, H ABC of Czech; **0315** M Mailbox, T One on One (interview), W Talking Point or Insight Central Europe, H Czechs in History or Profile, F Economic Report, A Magazine.

RADIO SWEDEN

0330 S Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th), M In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), T-A Sixty Degrees North (regional report); **0345** T Sports Scan, W Close Up (profiles of Swedes-1st/3rd), H Money Matters, F Nordic Report (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), A Review of the Newsweek.

RADIO TAIPEI INT.

0300 D News; **0315** S Great Wall Forum (discussing the mainland), M Taiwan Economic Journal, T Culture Express, W Taiwan Today, H Discover Taiwan, F Instant Noodles, A Kaleidoscope (life in Taiwan); **0330** S Asia Pacific, M People, T Trends, W Confucius & Inspiration Beyond, H Life Unusual, F People, A Mailbag Time; **0345** M-F Let's Learn Chinese (M/W/F elementary, T/H intermediate), A Best of Naluwan.

RADIO UKRAINE INT.

0300 D News; **0306** M Hello From Kiev (listener letters/music); **0310** T-S Ukraine Today (magazine); **0318** S Baroque (the arts); **0320** M Music from Ukraine; **0325** T-F Closeup (current issues).

VOICE OF RUSSIA

0300 D News; **0311** M Sunday Panorama, T-S News & Views; **0324** M Russia:

Shortwave Guide



People & Events; **0330** D News in Brief; **0332** S Kaleidoscope (Russian events), M Audio Book Club (Russian lit.), T/H/A 20th Century, W/F Russian history/culture.

VOICE OF VIETNAM

0330 D News; **0335** D Current Affairs; **0340** Su Weekly Review, M Sunday Show, T/W/F/A Press Review, H Talk of the Week; **0345** T Vietnam: Land & People, W Culture & Society, H Letterbox, F Vietnam Economy, A Rural Vietnam; **0350** S Music, A Literature and Arts.

WBCQ, Maine

7415 kHz.: **0300** S You Are What You Think, M Radio New York International (from 0000), F Veronica/Passaro Music Hour.

WHRI, Indiana

5745 kHz.: **0302** S 20, The Countdown Magazine (Christian rock music charts to 0500); **0305** T-A Music (Christian contemporary/gospel).

7315 kHz.: **0302** S 20, The Countdown Magazine (Christian rock music charts to 0500); **0305** M Music (Christian contemporary/gospel); **0330** M DXing with Cumbre.

7580 kHz.: **0305** T-A Music (Christian contemporary/gospel); **0335** S Music (Christian contemporary/gospel).

WRMI, Florida

7385 kHz.: **0330** S Viva Miami (magazine).

WWCR Tennessee

5070 kHz.: **0300** S Spectrum (communications discussion).

0400 UTC/ 12am E/9pm P - Page 44 Freqs

BBC WORLD SERVICE (am) - 5975, 11835

0400 D The World Today; **0430** S Global Business, A Assignment; **0450** M-F Sports Roundup.

BBC WORLD SERVICE (eu) - 6195, 9410

0400 D The World Today; **0430** S Global Business, A Network Europe; **0450** M-F Sports Roundup.

BBC WORLD SERVICE (me) - 12095, 15575

0400 D The World Today; **0430** S In Praise of God, A Assignment; **0450** M-F Sports Roundup.

BBC WORLD SERVICE (aaf) - 15420, 17640

0400 D The World Today; **0430** S African Perspective, M-F Network Africa, A Talkabout Africa.

BBC WORLD SERVICE (waf) - 6005, 7120, 7160

0400 D The World Today; **0430** S African Perspective, M-F Network Africa, A African Quiz/This Week and Africa.

BBC WORLD SERVICE (eas) - 15280

0400 S The World Today, M-A News; **0430** S The Hitch-Hiker's Guide to the Galaxy, A Assignment; **0445** M-F Sports Roundup.

CHINA RADIO INT.

0400 D News; **0410** S Report on Developing Countries, M-F Current Affairs, A Biz China; **0420** S In the Spotlight (cultural magazine), A Cutting Edge (sci/tech); **0430** M People in the Know (China's leading citizens), T Sports World, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

HCBJ, Ecuador

0400 S DX Partyline, M Musical Mailbag, T-A Latin American & World News; **0410** T-A Studio 9 (Latin American regional report including T Inside HCBJ, W/F Did You Hear? (news comment), H Ham Radio Today, A Musica del Ecuador); **0430** S Saludos Amigos, M Mountain Meditations, T-A A New Beginning; **0445** T-A A Time for Truth.

RADIO AUSTRALIA

0400 D News; **0405** S/A Pacific Focus (S arts, A environment); **0410** M-F Margaret Throsby (interviews and music); **0430** S RA Arts, A The Buzz (technology issues). [Special service: **0405** S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO HABANA CUBA

0400 D International News; **0410** M From Habana (Cuban musicians), T-S National News; **0415** T-S Reports and music; **0430** M The Jazz Place or Top Tens, T-S News Bulletin; **0435** S World of Stamps, T-A Reports and music; **0450** S Cuban music.

RADIO NETHERLANDS

0430 S/M News; T-A Newline; **0435** S Europe Unzipped, M Sincerely Yours; **0455** S Insight, M The Week Ahead.

RADIO NEW ZEALAND INT.

0400 D RNZ News; **0406** S Playhouse (radio theatre)*, M-F In Touch with New Zealand (from 0205), A Home Grown (NZ music to 0600, including Musical Chairs-artist feature 0430*).

RADIO FOR PEACE INT., Costa Rica

0400 S CounterSpin (media analysis), M Music Medicine, T-A Democracy Now! (Pacifica Radio's daily report); **0430** S Freespeech Radio News (repeat of Fri. newscast).

RADIO ROMANIA INT.

0400 D Radio Newsreel; **0410** S The Week, M Focus, T-A Commentary; **0415** S World of Culture, M Sunday Studio, T Pro Memoria (history), W Business Club, H Society Today, F Cards on the Table (debate) or The Romanian Next to You (interview), A Challenge for the Future or Terra 2001; **0420** S RRI Encyclopedia, T Political Flash, W European Horizons; **0425** S Roots (culture/traditions), M Romanian by Radio, T/H/A Business Update, W Tourist News, F Listeners' Letterbox; **0430** S Radio Pictures, M Romanian Itineraries, T Pulse of Transition, W Mother Nature (ecology), H Visit Romania, A Practical Guide; **0435** S Romanian Itineraries, M Listeners' Letterbox, T Performing Arts, W Youth Club, H Partners in a Changing World, A Cultural Survey; **0440** S, Bucharest Along the Centuries, T Pages of Romanian Literature, W/F Skylark (folk music), H Stage and Screen, A Spectator (voice of the people); **0445** S DX Mailbag, T Romanian Hits, H Romanian Musicians, A Romanian Folk Music At Its Best; **0450** M Romanian Folk Music At Its Best, T Sports Roundup, W Athlete of the Week, H Sports Club, F Football Flash, A Sports Weekend.

RV, BELGIUM

0400 S Music from Flanders, M Radio World, T-A News; **0404** T-A Belgium Today; **0408** M Tourism in Flanders; **0413** T Focus on Europe, W Green Society (ecology), H/A Around the Arts, F Economics; **0414** M Brussels 1043 (letters); **0418** T Sports, H Around Town, F International Report, A Tourism in Flanders; **0424** M-A Soundbox (Flemish rock).

VOICE OF RUSSIA

0400 D News; **0411** S Russian Musical Highlights, M Musical Portraits of the 20th Century, T/F Moscow Mailbag, W/A Science and Engineering, H Newmarket (business); **0430** D News in Brief; **0432** S/A Timelines, M Jazz Show, T Yours for the Asking, W Moscow Yesterday & Today, H Folk Box, F Audio Book Club (Russian lit.); **0447** T Music At Your Request.

WBCQ, Maine

7415 kHz.: **0400** S Tom & Darryl (electronic media), M-A Amos 'n Andy.

WHRI, Indiana

5745 kHz.: **0400** S 20, The Countdown Magazine (from 0302).
7315 kHz.: **0400** S 20, The Countdown Magazine (from 0302); **0405** M-F Music (Christian contemporary and gospel).
7580 kHz.: **0430** A DXing with Cumbre.

WWCR, Tennessee

3210 kHz.: **0400** S Cyber Line (computers).
5070 kHz.: **0400** S Cyber Line (computers).

0500 UTC/ 1am E/10pm P - Page 45 Freqs

BBC WORLD SERVICE (eu) - 6195, 9410, 12095

0500 D The World Today; **0530** S Pick of the World (BBC's best), A From Our Own Correspondent; **0545** A Letter from America (Alistair Cooke).

BBC WORLD SERVICE (me) - 15565, 15575

0500 D The World Today; **0530** S Global Business, A World Business Review; **0545** A Letter from America (Alistair Cooke).

BBC WORLD SERVICE (aaf) - 11940

0500 D The World Today; **0530** S Artbeat, M-F Network Africa, A African Quiz or This Week And Africa.

BBC WORLD SERVICE (waf) - 6005, 7160, 11765

0500 D The World Today; **0530** S Artbeat, M-F Network Africa, A Talkabout Africa.

BBC WORLD SERVICE (eas) - 15280

0500 D The World Today; **0530** SMHA World Learning, T Write On, W Heart & Soul (religion), F What's the Problem?.

DEUTSCHE WELLE

0500 D News; **0505** S Talking Point (journalists), M Religion & Society, T-A Newslink (European current affairs); **0515** S Money Talks, M COOL! (youth magazine); **0530** T Insight (international affairs), W Man & Environment, H Living in Germany, F Hard to Beat: The World of Sport, A German by Radio.

HCBJ, Ecuador

0500 S Inspirational Classics, M Renewing Your Mind, T-S Family Life Today; **0530** S Did You Hear (news comment), M Unshackled (radio's oldest drama series), T Let My People Think (apologetics), W Words for Women, H Adventures in Odyssey (children), F Book & the Spade (religion & archaeology), A Walkin' in the Sunshine (country music); **0545** S Specialized English, W Wonderful Words of Life (hymns), F Science, Scripture & Salvation.

RADIO AUSTRALIA

0500 D News; **0505** S/A Pacific Focus (S business, A sport); **0510** M-F Pacific Beat (Pacific islands magazine w/regional sports report 0530); **0530** S Fine Music Australia (classical), A Lingua Franca (about language); **0545** A Short Story. [Special service: **0505** S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO HABANA CUBA

0500 D International News; **0510** M Weekly Review, T-S National News; **0515** T-S Viewpoint; **0530** M Reports & Music, T-S News Bulletin; **0535** T-A Time Out (sports); **0540** S/W DXers Unlimited, M Mailbag Show, T/H/F Caribbean Outlook, A Weekly Review; **0550** M Breakthrough (science report).

RADIO JAPAN

0500 D News; **0510** S Pop Joins the World, A Hello from Tokyo (listener contact); **0515** M-F 44 Minutes (feature magazine).

RADIO NETHERLANDS

0500 S Roughly Speaking, M Dutch Horizons, T Research File (science), H Documentary, F Aural Tapestry (cultural magazine), A A Good Life (global development).

RADIO NEW ZEALAND INT.

0500 D RNZ News; **0505** S Spiritual Outlook*, M-F Checkpoint (comprehensive news), A Home Grown (NZ music from 0405).

RADIO FOR PEACE INT., Costa Rica

0500 S TUC Radio, M Neumaier Report, T Between the Lines, W A Woman's Voice, H Alternative Radio, F Making Contact (reports & interviews), A Honoring Mother Earth: Indigenous Voices; **0515** M Living Enrichment Center; **0530** S Continent of Media, T TUC Radio, F Steppin' Out of Babylon.

VOICE OF NIGERIA

0500 S/A News Summary, M-VON Scope, A African Safari (music); **0505** S VON Link-Up, A African Safari; **0530** D News about Nigeria; **0540** D News About Africa; **0545** D World News; **0555** D Commentary.

WBCQ, Maine

7415 kHz.: **0500** S Tom & Darryl (cont'd. from 0400-1st/3rd wks.), H World of Radio, A The Clone Zone; **0530** H Radio DC.

WHRI, Indiana

5745 kHz.: **0500** A DXing with Cumbre; **0530** A World Harvest Country Style.
7315 kHz.: **0500** M-F Music (Christian contemporary and gospel), A DXing with Cumbre; **0530** A World Harvest Country Style.

WWCR, Tennessee

3210 kHz.: **0500** M World of Radio; **0505** A Rock the Universe (Christian rock music).
5070 kHz.: **0500** S World Wide Country Radio (music), T Ask WWCR (letters); **0505** M A View from Europe.

0600 UTC/ 2am E/11pm P - Page 45 Freqs

BBC WORLD SERVICE (eu) - 9410, 12095, 15485

0600 D World Briefing; **0620** D Sports Roundup; **0630** S Agenda (trends), M-F World Business Report, A People and Politics; **0645** M Letter from America (Alistair Cooke comments), T/W/F Analysis, H From Our Own Correspondent.

BBC WORLD SERVICE (me) - 15565, 15575

0600 S World Briefing, M-A News; **0605** M Talking Point, T-A Outlook; **0620** S Sports Roundup; **0630** S Agenda (trends); **0645** M-F Off the Shelf (book readings), A Patterns of Faith (belief systems).

BBC WORLD SERVICE (aaf) - 11940

[same as (me) schedule above]

Shortwave Guide



BBC WORLD SERVICE (wca) - 6005, 7160, 11765

0600 D World Briefing; **0620** D Sports Roundup; **0630** S Agenda (trends), M-F Network Africa, A African Quiz or This Week And Africa.

BBC WORLD SERVICE (eas) - 15280

0600 S/A World Briefing, M-F News; **0605** M Arts in Action, T Meridian-Masterpiece, W Meridian-Screen, H Meridian-Writing, F The Music Biz; **0620** S/A Sports Roundup; **0630** S Westway Omnibus (drama serial), M Jazzmatazz, T Charlie Gillett (world music), W UK Top 20, H Revolver, F John Peel (eclectic music), A People and Politics.

RADIO AUSTRALIA

0600 D News; **0605** S The Europeans, A Feedback (letters/station news); **0610** M-F Regional Sports Report; **0620** M-F Pacific Focus (M business, T health, W environment, H sport, F culture); **0630** A Oz Sounds (new releases); **0634** S Ockham's Razor (a science issue); **0640** M Oz Music Show (rock), T Music Deli (diverse world/folk), W Blacktracker (contemporary Aboriginal), H Australian Country Style, F Jazz Notes

[Special service: **0605** S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO HABANA CUBA

0600 D International News; **0610** M From Habana (Cuban musicians), T-S National News; **0615** T-S Reports and music; **0630** M The Jazz Place or Top Tens, T-S News Bulletin; **0635** S World of Stamps, T-A Reports and music; **0650** S Cuban music.

RADIO JAPAN

0600 D RNZ News; **0606** S Whenua (Maori magazine)*, M-F What's Going On? (arts & entertainment calendar), A Tagata a te Moana (Pacific culture)*; **0630** M-F Worldwatch; **0645** M-F Storytime.

RADIO NEW ZEALAND INT.

0600 D RNZ News; **0606** S Whenua (Maori magazine), M-F What's Going On? (arts & entertainment calendar), A Feature; **0630** M Letter from America (BBC), T-H Today in Parliament, F The Pacific Report, A In a Mellow Tone (soft sounds); **0645** M-F Storytime.

RADIO FOR PEACE INT., Costa Rica

0600 S World of Radio, M Spiritual Awakening, T-A Freespeech Radio News; **0630** S RFP Mailbag, M One World—One Family (Bahai program), T/H/A Hightower Radio (commentary), W Radio Nation ("The Nation"), F This Way Out (gays magazine); **0035** T/H/A Earthwatch (ecology); **0640** T/H/A Earth & Sky (astronomy); **0645** T Tropical Conservation Newsbureau (rainforests), H World Citizen's Weekly Commentary, A Women (UN program).

VOICE OF NIGERIA

0600 S This Week on VON, M-F Moving On, A Weekend Magazine; **0615** S Soul Life; **0630** S/A Reporter's Diary, M-F African Press; **0645** S From the Racks, M-F Insight, A Listeners' Letters.

WHRI, Indiana

5745 kHz.: **0630** S DXing with Cumbre.
7315 kHz.: **0604** A Turn Your Radio On; **0630** S World Harvest Country Style.

WWCR, Tennessee

3210 kHz.: **0600** S The Big Backyard (Australian country music), M Spectrum (communications discussion); **0605** T-F World Wide Country Radio (music).
5070 kHz.: **0605** S This Week in Americana (antiques); **0630** S World of Radio.

1000 UTC/6am E/3am P - Page 47 Freqs

BBC WORLD SERVICE (am) - 6195

1000 D World Briefing; **1020** S/A Sports Roundup; **1030** S Agenda (trends), M-F World Business Report, A Reporting Religion; **1045** M-F Sports Roundup.

BBC WORLD SERVICE (eu) - 12095, 15485

1000 D World Briefing; **1020** S/A Sports Roundup; **1030** S Network Europe, M-F World Business Report, A Science in Action; **1045** M-F Sports Roundup.

BBC WORLD SERVICE (me) - 15565, 15575

1000 D World Briefing; **1020** S/A Sports Roundup; **1030** S/A World Learning, M-F World Business Report; **1045** M-F Sports Roundup.

BBC WORLD SERVICE (eas) - 9740

1000 S News Summary, M-F World Briefing, A News; **1001** S Concert Hall; **1005** A Composer of the Month; **1030** M-F World Business Report, A Music Review; **1045** M-F Sports Roundup.

RADIO AUSTRALIA

1000 D News; **1005** S The Buzz (technology issues), M-F Asia Pacific (regional current affairs), A Pacific Review; **1030** S Rural Reporter, M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor, A In Conversation.

RADIO NETHERLANDS

1030 S/A News, M-F Newline; **1035** S Wide Angle, A Europe Unzipped (lifestyle magazine); **1055** S The Week Ahead (program guide), A Insight (commentary).

RADIO NEW ZEALAND INT.

1000 D News; **1005** S Mediawatch, M-F Late Edition (the day's news), A Deep Purple (relaxing music/nostalgia); **1035** S Sunday Supplement.

RADIO FOR PEACE INT., Costa Rica

1000 S CounterSpin (media analysis), M Music Medicine, T-A Democracy Now! (Pacifica Radio's daily report); **1030** S Freespeech Radio News (repeat of Fri. newscast).

VOICE OF AMERICA (News Now)

1000 M-F News; **1015** M-F Focus; **1020** M-F Sports; **1030** M-F Headlines; **1033** S/H/A On the Line (US foreign policy), M Press Conference USA, T Encounter (foreign affairs debate), W Our World (science), F Best of 'Talk to America' (interviews).

WHRI, Indiana

6040 kHz.: **1005** A For the People (populist phone-in to 1200).
9495 kHz.: **1005** M-F Music (contemporary Christian/Gospel).

WWCR, Tennessee

5070 kHz.: **1000** A The Old Record Shop (vintage recordings); **1010** S A View from Europe.
15825 kHz.: **1000** M-F World Wide Country Radio (country music); **1015** S Ask WWCR (letters).

1100 UTC/ 7am E/4am P - Page 48 Freqs

BBC WORLD SERVICE (am) - 15190

1100 D World Briefing; **1105** M-F Caribbean Morning Report; **1110** M-F Caribbean Sport; **1115** M-F Caribbean Magazine; **1120** D British News; **1130** S Assignment, M Letter from America, T/W/F/A Analysis, H From Our Own Correspondent; **1145** M-H, A Sports Roundup, F Football Extra.

BBC WORLD SERVICE (eu) - 12095, 15485

1100 D World Briefing; **1120** D British News; **1130** S Assignment, M Letter from America, T/W/F/A Analysis, H From Our Own Correspondent; **1145** M-H, A Sports Roundup, F Football Extra.

BBC WORLD SERVICE (me) - 15565, 15575, 17640

1100 S World Briefing, M-A News; **1105** M Arts in Action, T Meridian-Masterpiece, W Meridian-Screen, H Meridian-Writing, F The Music Biz, A Wright Around the World (music requests); **1120** S British News; **1130** S Assignment, M Jazzmatazz, T Charlie Gillett (world music), W UK Top 20, H Revolver, F John Peel (eclectic music).

BBC WORLD SERVICE (wca) - 17830

1100 D World Briefing; **1120** D British News; **1130** S Pastmark Africa, M-F World Business Report, A Inside Track (African sport); **1145** M-H Sports Roundup, A Football Extra.

BBC WORLD SERVICE (eas) - 9740

1100 S/A World Briefing, M-F News; **1105** M Health Matters, T Go Digital, W Discovery, H One Planet (ecology), F Science in Action; **1120** S/A British News; **1130** S Play of the Week (radio theatre), M Everywoman, T Omnibus (documentary), W Sports International, H People and Places, F Essential Guide, A Analysis; **1145** A Sports Roundup.

HCB, Ecuador

1100 S Let My People Think, M-F Insight for Living, A We Kids; **1128** M-F Money Minute; **1130** S Encounter, M-F Morning in the Mountains (Christian breakfast show w/News 1130, Overcomers 1133, Listen to the Bible 1140, Beyond the Call 1145), A Down Gilead Lane.

RADIO AUSTRALIA

1100 D News; **1105** S Correspondents' Report, M-A Asia Pacific; **1130** S Business Report, M-F Bush Telegraph (rural magazine), A Fine Music Australia (classical).

RADIO JAPAN

1100 D News; **1110** S Hello from Tokyo (listener contact), A Pop Joins the World; **1115** M-F Asian Top News (headlines from region's radio); **1125** M Japan

Music Log, T Let's Learn Japanese, W Japan Music Treasure Box, H Brush Up Your Japanese, F Music Beat.

RADIO KOREA INT.

1130 D News; **1140** S Korean Pop Interactive (requests), M-F News Commentary, A Seoul Report (week in review); **1145** M-F Seoul Calling (magazine).

RADIO NETHERLANDS

1100 S Aural Tapestry (culture), M EuroQuest (Europe in context), T A Good Life (development issues), W Dutch Horizons, H Research File (science), F Documentary, A Roughly Speaking (Euro youth culture); **1130** S Dutch Horizons, M Research File, T/A Music 52-15 (international music), W Documentary, H Aural Tapestry, F A Good Life.

RADIO NEW ZEALAND INT.

1100 D RNZ News; **1105** S/A NZ Forces Programme (to 1300), M-H Nine to Noon (current affairs), F Sports Story; **1130** F Top 5 (music).

RADIO FOR PEACE INT., Costa Rica

1100 S TUC Radio, M Neumaier Report, T Between the Lines, W A Woman's Voice, H Alternative Radio, F Making Contact (reports & interviews), A Honoring Mother Earth: Indigenous Voices; **1115** M Living Enrichment Center; **1130** S Continent of Media, T TUC Radio, F Steppin' Out of Babylon.

RADIO SWEDEN

1130 S In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report), A Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th); **1145** M Sports Scan, T Close Up (profiles of Swedes-1st/3rd), W Money Matters, H Nordic Report (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), F Review of the Newsweek.

WHRI, Indiana

6040 kHz.: **1105** A For the People (from 1005).
9495 kHz.: **1145** M-F Music (Christian contemporary/gospel).

WWCR, Tennessee

5070 kHz.: **1100** S Ken's Country Classics; **1105** A This Week in Americana (antiques), W America's Greatest Heroes.
15685 kHz.: **1115** A Eco Watch.

1200 UTC/ 8am E/5am P - Page 48 Freqs

BBC WORLD SERVICE (am) - 15190

1200 D Newshour; **1205** M-F Caribbean Business **1210** M-F Caribbean Morning Report 2nd Edition; **1220** M-F Newshour (continued).

BBC WORLD SERVICE (me) - 15565, 15575, 17640

1200 D Newshour.

BBC WORLD SERVICE (wca) - 17830

1200 D Newshour.

BBC WORLD SERVICE (eu) - 12095, 15485

1200 D Newshour.

BBC WORLD SERVICE (eas) - 9740

1200 M-A News; **1205** M-F Outlook (magazine), A The Hitch-Hiker's Guide to the Galaxy; **1230** S Assignment, A Agenda (trends); **1245** M Write On, T Heart and Soul, W/F Westway (drama serial), H What's the Problem?

HCB, Ecuador

1200 S Moody Presents, M-F Morning in the Mountains (cont'd. from 1130 w/News 1200 & 1230, Insights 1205, Sports 1206, Mission Network News 1220, Guidelines for Living 1233, Did You Hear? 1245), A Adventures in Odyssey; **1230** S The Living Word, A Toonz!

RADIO AUSTRALIA

1200 D News; **1205** S Nocturne (innovative music to 1400), M-H Late Night Live (discussion and interviews), F Sound Quality (innovative music), A The Spirit of Things (spiritual matters).

RADIO CANADA INT.

1200 M-F News; **1210** M-F This Morning (magazine to 1500).

RADIO KOREA INT.

1200 S Multiwave Feedback (letters/DX news), M Exploring the New Millennium, T Cultural Promenade, W Economic Radar, H Korea & Its Splendors, F Notes of Nostalgia (traditional music), A From Us to You (letters).

Shortwave Guide



RADIO NETHERLANDS

1200 S/A News, M-F Newline; **1205** S Sincerely Yours (listener letters), A Europe Unzipped.

RADIO NEW ZEALAND INT.

1200 D News; **1205** S/A NZ Forces Programme (from 1105), M-F Late Edition (repeat of 1005).

RADIO FOR PEACE INT., Costa Rica

1200 S World of Radio, M Spiritual Awakening, T-A Freespeech Radio News; **1230** S RFPI Mailbag, M One World—One Family (Bahai program), T/H/A Hightower Radio (commentary), W Radio Nation ("The Nation"), F This Way Out (goys magazine); **1235** T/H/A Earthwatch (ecology); **1240** T/H/A Earth & Sky (astronomy); **1245** T Tropical Conservation Newsbureau (rainforests), H World Citizen's Weekly Commentary, A Women (UN program).

RADIO SWEDEN

1230 S In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report), A Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th); **1245** M Sports Scan, T Close Up (profiles of Swedes-1st/3rd), W Money Matters, H Nordic Report (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), F Review of the Newsweek.

WHRI, Indiana

6040 kHz.: **1200** A DXing with Cumbre; **1230** A World Harvest Country Style. 9495 kHz.: **1230** A DXing with Cumbre.

WWCR, Tennessee

5070 kHz.: **1205** A Rock the Universe. 12160 kHz.: **1200** S Dialogue.

YLE RADIO FINLAND

1230 M-A News; **1235** M-H Finland This Morning (magazine), F Capital Cafe (interview), A Finland This Week (news review); **1245** A Starting Finnish (language lesson); **1255** A Nuuni Latini (news in classical Latin).

1300 UTC/ 9am E/6am P - Page 49 Freqs

BBC WORLD SERVICE (am) - 15190

1300 D News; **1305** S Composer of the Month, M-F Outlook (magazine), A World Football; **1330** S In Praise of God, A The Music Feature; **1345** M-F Off the Shelf (book readings).

BBC WORLD SERVICE (eu) - 12095, 15485

1300 D News; **1305** S The Hitch-Hiker's Guide to the Galaxy, M-F Outlook (magazine), A Wright Around the World (music requests); **1330** S Global Business; **1345** M Write On, T Heart & Soul (religion), W/F Westway (drama serial), H What's the Problem? (advice).

BBC WORLD SERVICE (me) - 15565, 15575, 17640

1300 D News; **1305** S Pick of the World (BBC's best), M Science in Action, T Health Matters, W Go Digital, H Discovery, F One Planet (ecology), A Composer of the Month; **1330** S Reporting Religion, M Essential Guide, T Everywoman, W Omnibus, H Sports International, F People and Places, A People and Politics.

BBC WORLD SERVICE (wcaf) - 17830

1300 D News; **1305** S Concert Hall, M Arts in Action, T Meridian-Masterpiece, W Meridian-Screen, H Meridian-Writing, F The Music Biz, A The Hitch-Hiker's Guide to the Galaxy; **1330** M Jazzmatazz, T Charlie Gillett (world music), W UK Top 20, H Revolver, F John Peel (eclectic music), A Music Review.

BBC WORLD SERVICE (esaf) - 21470

1300 D Newshour.

BBC WORLD SERVICE (oas) - 9740

1300 D Newshour; **1350** M-F World Business Report.

CHINA RADIO INT.

1300 D News; **1310** S Report on Developing Countries, M-F Current Affairs, A Biz China; **1320** S In the Spotlight (cultural magazine), A Cutting Edge (sci/tech); **1330** M People in the Know (China's leading citizens), T Sports World, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

HCB, Ecuador

1300 S Viewpoint, M-F Precept, A Toonz! (from 1230); **1313** M-F Getting the Message; **1315** M-F Proclaim; **1330** S Mountain Meditations, M-F Family Life Today, A Rock Solid.

RADIO AUSTRALIA

1300 D News; **1305** S Nocturne (innovative music from 1205), A The Science Show; **1310** M-F Sports; **1315** M-F Dust & Dollars (stock market); **1320** M-F The Planet (diverse music to 1500).

RADIO CANADA INT.

1300 D News; **1305** S The Sunday Edition (arts/ideas magazine to 1600), M-F This Morning (cont'd. from 1210), A The House (Canadian politics).

RADIO FOR PEACE INT., Costa Rica

1300 S Making Contact, M Every Living Thing (nature), T Disability Radio Worldwide, W World of Radio, H A Public Affair, F Far Right Radio Review, A Continent of Media; **1330** S Alternative Radio (political/social analysis), T This Way Out (goys magazine), W RFPI Mailbag, A World of Radio.

RADIO SWEDEN

1330 S In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report), A Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th); **1345** M Sports Scan, T Close Up (profiles of Swedes-1st/3rd), W Money Matters, H Nordic Report (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), F Review of the Newsweek.

WHRI, Indiana

15105 kHz.: **1300** S World Harvest Country Style. **1345** A Music (Christian contemporary and gospel).

WWCR, Tennessee

15825 kHz.: **1330** S The Old Record Shop (vintage recordings).

1400 UTC/ 10am E/7am P - Page 49 Freqs

BBC WORLD SERVICE (am) - 15190

1400 D News; **1405** S Talking Point (global phone-in), M Meridian-Masterpiece, T Meridian-Screen, W Meridian-Writing, H The Music Biz, F Arts in Action, A Sportsworld (live action to 1700); **1430** M Charlie Gillett, T UK Top 20, W Revolver, H John Peel, F Jazzmatazz.

BBC WORLD SERVICE (eu) - 12095, 15485

1400 D News; **1405** S Talking Point (global phone-in), M Science in Action, T Health Matters, W Go Digital, H Discovery, F One Planet (ecology), A Sportsworld (live action); **1430** M Essential Guide, T Everywoman, W Omnibus, H Sports International, F People and Places.

BBC WORLD SERVICE (wcaf) - 17830

[same as (eu) schedule above]

BBC WORLD SERVICE (me) - 15565, 15575, 17640

1400 S/A News, M-F World Briefing; **1405** S Talking Point (global phone-in), A Sportsworld (live action); **1420** M-F World Business Report; **1430** M-F British News; **1445** M-H Sports Roundup, F Football Extra.

BBC WORLD SERVICE (esaf) - 21470, 21660

[same as (me) schedule above]

BBC WORLD SERVICE (oas) - 9740

1400 S/A News, M-F East Asia Today; **1405** S Talking Point (global phone-in), A Sportsworld (live action); **1430** M-F British News; **1445** M-H Sports Roundup, F Football Extra.

CHINA RADIO INT.

1400 D News; **1410** S Report on Developing Countries, M-F Current Affairs, A Biz China; **1420** S In the Spotlight (cultural magazine), A Cutting Edge (sci/tech); **1430** M People in the Know (China's leading citizens), T Sports World, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

HCB, Ecuador

1400 S Renewing Your Mind, M-F Haven, A Rock Solid (from 1330).

RADIO AUSTRALIA

1400 D News; **1405** S Books and Writing, M-F The Planet (cont'd. from 1315), A New Dimensions ("progressive" ideas).

RADIO CANADA INT.

1400 D News; **1405** S The Sunday Edition (cont'd. from 1310), M-F This Morning (cont'd. from 1210), A Vinyl Cafe; **1430** F C'est La Vie (life in French Canada); **1445** M-H Out Front (experimental radio).

RADIO JAPAN

1400 D News; **1410** S Pop Joins the World, A Weekend Square (Japanese life); **1415** M-F 44 Minutes (feature magazine).

RADIO NETHERLANDS

1430 S/A News, M-F Newline; **1435** S Sincerely Yours (listener letters), A Europe Unzipped (Europe in context); **1455** S The Week Ahead (program guide), A Insight (commentary).

RADIO FOR PEACE INT., Costa Rica

1400 S Alternative Radio (from 1330), M New Dimensions, T University Forum (interviews), W Continent of Media, H WINGS (women's news), F Disability Radio Worldwide, A RFPI Mailbag; **1430** S Far Right Radio Review, T Honoring Mother Earth: Indigenous Voices, W Earthspan (War & Peace Foundation), H Global Community Forum (interviews), F A Woman's Voice, A University Forum (peace studies).

WHRI, Indiana

15105 kHz.: **1430** M-F Music (Christian contemporary and gospel).

1500 UTC/ 11am E/8am P - Page 50 Freqs

BBC WORLD SERVICE (am) - 15190

1500 D News; **1501** S Concert Hall; **1505** M One Planet (ecology), T Science in Action, W Health Matters, H Go Digital, F Discovery; **1530** M People & Places, T Essential Guide, W Everywoman, H Omnibus (documentary), F Sports International.

BBC WORLD SERVICE (eu) - 12095, 15485

1500 S/A News, M-F World Briefing; **1505** S Concert Hall, A Sportsworld (live action); **1530** M-F British News; **1545** MTHF Analysis, W From Our Own Correspondent.

BBC WORLD SERVICE (me) - 15565

1500 D News; **1505** S Concert Hall, M-F Outlook (magazine), A Sportsworld (from 1405); **1545** M Write On, T Heart & Soul (religion), W/F Westway (drama serial), H What's the Problem?

BBC WORLD SERVICE (wcaf) - 15400, 17830

1500 D News; **1501** S Play of the Week; **1505** M-F Focus on Africa, A Sportsworld; **1530** M Write On, T Heart & Soul (religion), W/F Westway (drama serial), H What's the Problem? (advice); **1545** Off the Shelf (serialized readings).

BBC WORLD SERVICE (esaf) - 21470, 21660

1500 D News; **1505** S Composer of the Month, M-F Focus on Africa, A Sportsworld; **1530** S Pick of the World (best of the BBC), M Write On, T Heart & Soul (religion), W/F Westway (drama serial), H What's the Problem? (advice); **1545** M-F Off the Shelf (serialized readings).

BBC WORLD SERVICE (oas) - 9740

1500 D News; **1505** S Composer of the Month, M Meridian-Masterpiece, T Meridian-Screen, W Meridian-Writing, H The Music Biz, F Arts in Action; **1530** S Pick of the World (best of the BBC), M Charlie Gillett, T UK Top 20, W Revolver, H John Peel, F Jazzmatazz.

CHINA RADIO INT.

1500 D News; **1510** S Report on Developing Countries, M-F Current Affairs, A Biz China; **1520** S In the Spotlight (cultural magazine), A Cutting Edge (sci/tech); **1530** M People in the Know (China's leading citizens), T Sports World, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA

1500 D News; **1505** S Encounter (religion in Australia), M-F Asia Pacific (regional current affairs), A Nocturne (innovative music); **1530** M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor.

RADIO AUSTRIA INT.

1530 D Report from Austria (magazine); **1535** S Network Europe, A Insight Central Europe; **1550** A Listener Letters.

RADIO CANADA INT.

1500 S/A News; **1505** S The Sunday Edition (cont'd. from 1310), A Quirks and Quarks (science).

RADIO NETHERLANDS

1500 S Dutch Horizons, M Research File, T/A Music 52-15, W Documentary, H Aural Tapestry, F A Good Life; **1530** S Aural Tapestry, M EuroQuest, T A Good Life, W Dutch Horizons, H Research File, F Documentary, A Roughly Speaking.

Shortwave Guide



RADIO FOR PEACE INT., Costa Rica

1500 S Far Right Radio Review (from 1430), M Voices of Our World (Maryknoll program), T Honoring Mother Earth: Indigenous Voices (from 1430), W Living Enrichment Center, H Global Community Forum (from 1430), F A Woman's Voice (from 1430), A Earthspan (War & Peace Foundation); **1530 S** World Citizens Weekly Commentary, M Perspective (UN program), T In the Moment, W Peace Forum, H Scope (UN program), F Tropical Conservation Newsbureau (rainforests), A Newmaier Report; **1545 S/M** Hightower Report (commentary), T-A UN Today; **1550 S/M** Earthwatch (ecology); **1555 S/M** Earth & Sky (astronomy).

WHRI, Indiana

15105 kHz.: **1505 M-F** Music (Christian contemporary and gospel).
17650 kHz.: **1505 M-F** Music (Christian contemporary and gospel); **1545 A** Music (Christian contemporary and gospel).

1600 UTC/ 12pm E/9am P - Page 50 Freqs

BBC WORLD SERVICE (am) - 15190

1600 S/A News, M-F Europe Today; **1605 S** Sportsworld (live action); **1630 M-F** World Business Report; **1645 M-F** Sports Roundup.

BBC WORLD SERVICE (eu) - 9410, 12095, 15485

[same as (am) schedule above]

BBC WORLD SERVICE (me) - 15565

1600 D News; **1605 S/A** Sportsworld (live action), M Meridian-Masterpiece, T Meridian-Screen, W Meridian-Writing, H The Music Biz, F Arts in Action; **1630 M** Charlie Gillett (world music), T UK Top 20, W Revolver, H John Peel (eclectic music), F Jazzmatazz.

BBC WORLD SERVICE (af) - 15400, 17830, 21470, 21660

1600 D News; **1605 S/A** Sportsworld (live action), M Meridian-Masterpiece, T Meridian-Screen, W Meridian-Music, H Meridian-Writing, F Omnibus (documentary); **1630 M/F** Fast Track (African sport), T African Perspective, W Talkabout Africa, H Artebeat.

HCB, Ecuador

1600 S Message of Truth, M-F Renewing Your Mind, A Words of Hope.

RADIO AUSTRALIA

1600 D News; **1605 S** The National Interest, M Margaret Throsby (music & interview), T Comfort Zone (design), W Verbatim (oral histories), H Hindsight (social history), F Awaye! (Aboriginal life); **1630 W** Street Stories.

RADIO NETHERLANDS

1600 S/A News, M-F Newslines; **1605 S** Wide Angle, A Europe Unzipped.

RADIO FOR PEACE INT., Costa Rica

1600 S Music Medicine, M-F Democracy Now! (Pacific Radio's daily report), A CounterSpin (media analysis); **1630 A** Freespeech Radio News (repeat of Fri. newscast).

WBCQ, Maine

17495 kHz.: **1600 A** Allan Weiner Worldwide.

WHRI, Indiana

15105 kHz.: **1600 A** Sports Spectrum Live; **1605 S-F** Music (Christian contemporary and gospel).

WWCR, Tennessee

15825 kHz.: **1600 M-F** World Wide Country Radio (country music).

1700 UTC/ 1pm E/10am P - Page 51 Freqs

BBC WORLD SERVICE (eu) - 9410

1700 D News; **1701 S** Play of the Week (radio theatre); **1705 M-F** Outlook (magazine), A From Our Own Correspondent; **1730 A** Agenda (trends); **1745 M** Write On, T Heart & Soul (religion), W/F Westway (drama serial), H What's the Problem? (advice).

BBC WORLD SERVICE (me) - 12095, 15565

1700 S-F News, A World Briefing; **1701 S** Play of the Week (radio theatre); **1705 M** Health Matters, T Go Digital, W Discovery, H One Planet (ecology), F Science in Action; **1720 A** British News; **1730 M** Everywoman, T Omnibus (documentary), W Sports International, H People and Places, F Essential Guide, A Westway Omnibus (drama serial).

BBC WORLD SERVICE (af) - 15400, 17830, 21470

1700 D News; **1705 D** Focus on Africa; **1745 D** Sports Roundup.

RADIO FOR PEACE INT., Costa Rica

1700 S Neumaier Report, M Between the Lines, T A Woman's Voice, W Alternative Radio, H Making Contact (reports & interviews), F Honoring Mother Earth: Indigenous Voices, A TUC Radio; **1715 S** Living Enrichment Center; **1730 M** TUC Radio, H Steppin' Out of Babylon, A Continent of Media.

SWISS RADIO INT.

1730 S/A Swiss Scene, M-F Newsnet; **1735 A** Take 2; **1740 S** Culture Zone (the arts-1st/3rd wk) or Out and About (Swiss places-2nd/4th wk), A Sounds Good (Swiss music-3rd/5th wk); **1745 F** Business Spotlight.

WBCQ, Maine

17495 kHz.: **1700 A** Marion's Attic (vintage recordings).

WHRI, Indiana

13760 kHz.: **1730 S** Music (Christian contemporary/gospel).

WWCR, Tennessee

15685 kHz.: **1730 T** Dialogue.

1800 UTC/ 2pm E/11am P - Page 51 Freqs

BBC WORLD SERVICE (eu) - 9410

1800 S/A World Briefing, M-F News; **1805 M** Meridian-Masterpiece, T Meridian-Screen, W Meridian-Writing, H The Music Biz, F Arts in Action; **1820 S/A** British News; **1830 S** Assignment, M Charlie Gillett (world music), T UK Top 20, W Revolver, H John Peel (eclectic music), F Jazzmatazz, A World Business Review; **1845 A** Letter from America.

BBC WORLD SERVICE (me) - 12095

1800 D World Briefing; **1820 D** British News; **1830 S** Assignment, M-F World Business Report, A World Business Review; **1845 M/T/H/F** Analysis, W From Our Own Correspondent, A Letter from America.

BBC WORLD SERVICE (wcaf) - 15400, 17830

[same as (me) schedule above]

BBC WORLD SERVICE (esaf) - 21470

1800 S/A World Briefing, M-F News; **1805 M** Health Matters, T Go Digital, W Discovery, H One Planet (ecology), F Science in Action; **1820 S/A** British News; **1830 S** Assignment, M Everywoman, T Omnibus (documentary), W Sports International, H People and Places, F Essential Guide, A World Business Review; **1845 A** Letter from America.

RADIO KUWAIT

1800 D Program Review; **1802 D** Burning of the Oil Wells; **1815 D** The Amir Speaks to the Nation for the Nation; **1830 D** News; **1845 S-H** Musical Interlude, F Pioneers, A Famous Personalities of Kuwait.

RADIO FOR PEACE INT., Costa Rica

1800 S Spiritual Awakening, M-F Freespeech Radio News, A World of Radio; **1830 S** One World—One Family (Bahai program), M/W/F Hightower Radio (commentary), T Radio Nation ("The Nation"), H This Way Out (gays magazine), A RFPI Mailbag; **1835 M/W/F** Earthwatch (ecology); **1840 M/W/F** Earth & Sky (astronomy); **1845 M** Tropical Conservation Newsbureau (rainforests), W World Citizen's Weekly Commentary, F Women (UN program).

WBCQ, Maine

17495 kHz.: **1800 A** Zomba's Mondo Record Party.

WHRI, Indiana

13760 kHz.: **1800 A** DXing with Cumbre.
15105 kHz.: **1800 A** World Harvest Country Style; **1805 S** Pat Boone, M-F For the People (populist phone-in); **1830 A** Live from Studio B.

1900 UTC/ 3pm E/12pm P - Page 52 Freqs

BBC WORLD SERVICE (eu) - 9410

1900 S/A World Briefing, M-F News; **1905 M** Health Matters, T Go Digital, W Discovery, H One Planet (ecology), F Science in Action; **1920 S/A** Sports Roundup; **1930 S** Reporting Religion, M Everywoman, T Omnibus (documentary), W Sports International, H People and Places, F Essential Guide, A Westway Omnibus (drama serial).

BBC WORLD SERVICE (wcaf) - 15400, 17830

1900 D News; **1905 S** From Our Own Correspondent, M-F Focus on Africa, A Westway Omnibus (drama serial); **1930 S/A** World Learning, M/F Fast Track (African sport), T Artebeat, W Talkabout Africa, H Postmark Africa.

BBC WORLD SERVICE (esaf) - 12095

1900 S-F News, A World Briefing; **1905 S** Wright Around the World (music requests), M-F Focus on Africa; **1920 A** Sports Roundup; **1930 M** Charlie Gillett (world music), T UK Top 20, W Revolver, H John Peel (eclectic music), F Jazzmatazz, A Music Review.

RADIO KUWAIT

1900 S-H Sounds of Today, F Home Matters, A Kuwait and the Media; **1915 D** Songs; **1930 D** Sahih Muslim; **1945 S** Pell Mell, M Helter Skelter, T Short Stories of Kuwait, W International Top 20, H Pop Session Special, F Discovering Your Hidden Powers, A Scene & Heard.

RADIO FOR PEACE INT., Costa Rica

1900 S Every Living Thing (nature), M Disability Radio Worldwide, T World of Radio, W A Public Affair, H Far Right Radio Review, F Continent of Media, A Making Contact; **1930 M** Earthspan (War & Peace Foundation), T RFPI Mailbag, F World of Radio, A Alternative Radio (political/social analysis).

SWISS RADIO INT.

1930 S/A Swiss Scene, M-F Newsnet; **1935 A** Take 2; **1740 S** Culture Zone (the arts-1st/3rd wk) or Out and About (Swiss places-2nd/4th wk), A Sounds Good (Swiss music-3rd/5th wk); **1945 F** Business Spotlight.

VOICE OF NIGERIA

1900 S Youth Forum, M Our Cities, T Our Environment, W Who Are the Nigerians?, H Listeners' Letters, F Nigerian Scene, A Folktales; **1915 H** Wheel of Progress, F Business Weekly, A Nigerian Newsletter; **1930 S** Window on Abuja, M Perspectives, T African Monarchy, W Theatre on the Air, H Women and Development, F Weekend Magazine, A Time for Highlife; **1945 S** From the Bookshelf, T Listeners' Letters.

WHRI, Indiana

5745 kHz.: **1905 M-F** Music (Christian contemporary/gospel).
9495 kHz.: **1905 M-F** For the People (from 1805); **1945 A** Music (contemporary Christian/gospel).

WWCR, Tennessee

15685 kHz.: **1930 T** New Horizons (science).

2000 UTC/ 4pm E/1pm P - Page 52 Freqs

BBC WORLD SERVICE (eu) - 9410

2000 D Newshour.

BBC WORLD SERVICE (af) - 11835, 12095, 15400

2000 D Newshour; **2050 D** Sports Roundup.

RADIO KUWAIT

2000 (all cont'd from 1945) S Pell Mell, M Helter Skelter, T Short Stories of Kuwait, W International Top 20, H Pop Session Special, F Discovering Your Hidden Powers, A Scene & Heard. **2015 D** Music; **2030 S-H** Kuwait: Land of Prosperity; **2050 D** News in Brief.

RADIO FOR PEACE INT., Costa Rica

2000 S New Dimensions, M University Forum (interviews), T Continent of Media, W WINGS (women's news), H Radio Nation ("The Nation"), F RFPI Mailbag, A Alternative Radio (from 1930); **2030 S** Far Right Radio Review, T Honoring Mother Earth: Indigenous Voices, W/A University of the Air (peace studies), H Global Community Forum (interviews), F A Woman's Voice.

SWISS RADIO INT.

2000 S/A Swiss Scene, M-F Newsnet; **2005 A** Take 2; **1740 S** Culture Zone (the arts-1st/3rd wk) or Out and About (Swiss places-2nd/4th wk), A Sounds Good (Swiss music-3rd/5th wk); **2015 F** Business Spotlight.

VOICE OF NIGERIA

2000 S News Bulletin, M-F Sixty Minutes, A African Hour; **2015 S** Sports Roundup; **2030 S** In the News.

WBCQ, Maine

7415 kHz.: **2000 H-S** Radio Caroline.

WHRI, Indiana

9495 kHz.: **2005 S** Music (Christian contemporary/gospel).

WWCR, Tennessee

9475 kHz.: **2000 F** Ask WWCR (letters); **2015 F** New Horizons (science); **2030 A** Presidential Radio Address/Democratic Response.
15685 kHz.: **2030 H** World of Radio.

Shortwave Guide



2100 UTC/ 5pm E/2pm P - Page 53 Freqs

BBC WORLD SERVICE (am) - 5975

2100 D News; **2105 S** Global Business, M-F World Business Report, A World Business Review; **2115 M-F** Caribbean Report; **2120 A** British News; **2130 D** Sports Roundup; **2145 S** Reporting Religion, M/T/H/F Analysis, W From Our Own Correspondent, A Letter from America.

[Caribbean Report also on 11675, 15390 kHz. Special service to the Falklands on 11680 kHz.: **2130 T/F** Calling the Falklands.]

BBC WORLD SERVICE (au) - 9410

2100 D News; **2105 S** Pick of the World, M-F World Business Report, A Composer of the Month; **2120 M-F** British News; **2130 S** The Hitch-Hiker's Guide to the Galaxy, M-F Sports Roundup, A Assignment; **2145 M-F** Off the Shelf (book readings).

BBC WORLD SERVICE (wca) - 11835, 15400

2100 D News; **2105 S** Wright Around the World (music requests), M Health Matters, T Go Digital, W Discovery, H One Planet (ecology), F Science in Action, A Composer of the Month; **2130 M** Everywoman, T Omnibus (documentary), W Sports International, H People and Places, F Essential Guide, A People and Politics.

RADIO AUSTRALIA

2100 D News; **2105 F** Feedback, A Australia All Over; **2110 S-H** AM (morning news magazine); **2130 S** Educational series, M Health Report, T Innovations, W Religion Report, H Rural Reporter, F Oz Sounds.

RADIO FOR PEACE INT., Costa Rica

2100 S Voices of Our World (Maryknoll program), M Honoring Mother Earth: Indigenous Voices (from 2030), T Living Enrichment Center, W Global Community Forum (from 2030), H A Woman's Voice (from 0230), F Earthspan (War & Peace Foundation), A Far Right Radio Review (from 2030); **2130 S** Perspective (UN program), M In the Moment, T Peace Forum, W Scope (UN program), H Tropical Conservation Newshour (rainforests), F Newmaier Report, A World Citizens Weekly Commentary; **2145 S/A** Hightower Report (commentary), M-F UN Today; **2150 S/A** Earthwatch (ecology); **2155 S/A** Earth & Sky (astronomy).

RADIO JAPAN

2100 D News; **2110 S** Weekend Square (Japanese life), M Pop Joins the World; **2115 T-A** Asian Top News; **2125 T** Japan Music Log, W Let's Learn Japanese, W Japan Music Treasure Box, H Brush Up Your Japanese, F Music Beat.

VOICE OF NIGERIA

2100 S Time for Highlife, M Musical Heritage, T Soul Lift, W Health Corner, H Perspectives, F Our Environment, A Talking Agriculture; **2115 M** World of the Arts, T Beyond the Poverty Line; **2130 S** Wheel of Progress, M From the Racks, T Ten Seconds, W YON Link-Up, H Our Cities, F Celebrations, A Theatre on the Air; **2145 S** Listeners' Letters, M Issues.

WBCQ, Maine

7415 kHz.: **2100 S** Radio Free Euphoria, M Jean Shepherd, W The Clone Zone, F Juliet's Wild Kingdom, A HarvZower; **2130 T** International World Beat Music, F Pub Sungenis Project.

WHRI, Indiana

5745 kHz.: **2100 S** DXing with Cumbre; **2105 M-H** For the People (populist phone-in); **2130 S** Music (Christian contemporary/gospel); 17650 kHz.: **2100 F** DXing with Cumbre; **2130 M-F** Music (Christian contemporary/gospel), A DXing with Cumbre.

2200 UTC/ 6pm E/3pm P - Page 53 Freqs

BBC WORLD SERVICE (am) - 5975

2200 D The World Today; **2230 S** Agenda (trends), F People and Politics, A From Our Own Correspondent.

BBC WORLD SERVICE (wca) - 11835, 15400

2200 D News; **2205 S** The Hitch-Hiker's Guide to the Galaxy, M-F Outlook (magazine), A Pick of the World (BBC's best); **2230 S** Assignment, A From Our Own Correspondent; **2245 M** Write On, T Heart and Soul (religion), W/F Westway (drama serial), H What's the Problem? (advice).

RADIO AUSTRALIA

2200 D News; **2205 F** Asia Pacific Weekend Edition, A Correspondents Report; **2210 S-H** AM (morning news magazine); **2230 A** Business Report; **2240 S** Australian Music Show (rock), M Music Deli (international), T Blacktracker (Aboriginal contemporary), W Country Style, H Jazz Notes.

RADIO CANADA INT.

2200 S/A The World This Weekend, M-F The World at 6; **2230 S** Inside Track (sports anthologies) M-F As It Happens (interviews with newsmakers), A Madly Off in All Directions (comedy).

RADIO FOR PEACE INT., Costa Rica

2200 S Music Medicine, M-F Democracy Now! (Pacifica Radio's daily report), A CounterSpin (media analysis); **2230 A** Freespeech Radio News.

RADIO PRAGUE

2230 D News; **2235 S** Letter from Prague, M-F Newsworld, A Readings from Czech Literature; **2240 S** The Arts, T Witness, W ABC of Czech, A Saturday Music (classical/folk/jazz); **2245 S** Mailbox, M One on One (interview), T Talking Point or Insight Central Europe, W Czechs in History or Profile, H Economic Report, F Magazine.

RVI, Belgium

2230 S Radio World, M-F News, A Music from Flanders; **2234 M-F** Belgium Today; **2238 S** Tourism in Flanders; **2243 M** Focus on Europe, T Green Society (ecology), W/F Around the Arts, H Economics; **2244 S** Brussels 1043 (letters); **2248 M** Sports, W Around Town, H International Report, F Tourism in Flanders; **2254 S-F** Soundbox (Flemish rock).

WBCQ, Maine

7415 kHz.: **2200 M** The RMF Show; **2230 H** Uncle Ed's Musical Memories, F Wanton Display of Control & Disruption, A Radio Timtron Worldwide.

WHRI, Indiana

5745 kHz.: **2200 S/A** Turn Your Radio On.
9495 kHz.: **2205 M-F** Music (Christian contemporary/gospel); **2230 S** Music (Christian contemporary/Gospel), A DXing with Cumbre.
17650 kHz.: **2205 M-F** For the People; **2230 S** Music (Christian contemporary/gospel).

WRMI, Florida

15725 kHz.: **2200 S** Wavescan.

2300 UTC/ 7pm E/4pm P - Page 54 Freqs

BBC WORLD SERVICE (am) - 5975

2300 S The World Today, M-F News, A News Summary; **2301 A** Play of the Week (radio theatre); **2305 M-F** Outlook (magazine); **2330 S** Greenfield Collection (classical music); **2345 M** Patterns of Faith, T What is Civil Society?, W Heart & Soul (religion), H What's the Problem?, F Health in Mind.

CHINA RADIO INT.

2300 D News; **2310 S** Report on Developing Countries, M-F Current Affairs, A Biz China; **2320 S** In the Spotlight (cultural magazine), A Cutting Edge (sci/tech); **2330 M** People in the Know (China's leading citizens), T Sports World, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA

2300 D News; **2305 F** Lingua Franca (about language, A All in the Mind (the brain); **2310 S-H** Asia Pacific (regional current affairs); **2320 F** Short Story; **2330 S** Earthbeat (ecology), M The Buzz (technology issues), T RA Arts, W Rural Reporter, H Media Report, F In Conversation, A Innovations (new products).

RADIO BULGARIA

2300 D News; **2310 S** Folk Studio (Bulgarian folk music), M-F Events and Developments (current affairs review), A Views Behind the News; **2320 M** Sports; **2325 M-F** Timeout for Music; **2330 F** Bulgarian Plaza (cultural magazine) or Walks and Talks (interesting places); **2335 M-W**, F-A Keyword Bulgaria (Bulgaria and things Bulgarian), H Answering Your Letters; **2345 M** Magazine Economy, T Arts and Artists; W History Club, H The Way We Live, F Radio Bulgaria Calling (for radio hobbyists).

RADIO CANADA INT.

2300 D CBC News; **2305 S** Global Village (world music), M-F As It Happens (interviews with newsmakers) [began at 2230], A Quirks & Quarks (science); **2330 W** Dispatches (world events through Canadian eyes).

RADIO NETHERLANDS

2330 S/A News; M-F Newline; **2335 S** Sincerely Yours (letters), A Europe Unzipped (lifestyle magazine); **2355 S** The Week Ahead (program guide), A Insight (commentary).

RADIO NEW ZEALAND INT.

2300 S-H World and Pacific News, F/A RNZ News; **2310 S-H** Sports News, F

Saturday Night with John Campbell, A Feature or series; **2315 S-H** Pacific Weather; **2317 Kim Hill** (interviews/current affairs).

RADIO FOR PEACE INT., Costa Rica

2300 S Neumaier Report, M Between the Lines, T A Woman's Voice, W Alternative Radio, H Making Contact (reports & interviews), F Honoring Mother Earth: Indigenous Voices, A TUC Radio; **2315 S** Living Enrichment Center; **2330 M/TUC** Radio, H Steppin' Out of Babylon, A Continent of Media.

RADIO ROMANIA INT.

2300 D Radio Newsreel; **2310 S** Focus, M-F Commentary, A The Week; **2315 S** Sunday Studio, M Pro Memoria (history), T Business Club, W Society Today, H Cards on the Table (debate) or The Romanian Next to You (interview), F Challenge for the Future or Terra 2001, A World of Culture; **2320 M** Political Flash, T European Horizons, A RRI Encyclopedia; **2325 S** Romanian by Radio, M/W/F Business Update, T Tourist News, H Listeners' Letterbox, A Roots (culture/traditions); **2330 S** Romanian Itineraries, M Pulse of Transition, T Mother Nature (ecology), W Visit Romania, F Practical Guide, A Radio Pictures; **2335 S** Listeners' Letterbox, M Performing Arts, T Youth Club, W Partners in a Changing World, F Cultural Survey, A Romanian Itineraries; **2340 M** Pages of Romanian Literature, T/H Skylark (folk music), W Stage and Screen, F Spectator (voice of the people), A Bucharest Along the Centuries; **2345 M** Romanian Hits, W Romanian Musicians, F Romanian Folk Music At Its Best, A DX Mailbag; **2350 S** Romanian Folk Music At Its Best, M Sports Roundup, T Athlete of the Week, W Sports Club, H Football Flash, F Sports Weekend.

SWISS RADIO INT.

2330 S/A Swiss Scene, M-F Newsnet; **2335 A** Take 2; **2340 S** Culture Zone (the arts-1st/3rd wk) or Out and About (Swiss places-2nd/4th wk), A Sounds Good (Swiss music-3rd/5th wk); **2345 F** Business Spotlight.

WBCQ, Maine

7415 kHz.: **2300 S** Le Show (humor/entertainment), H Goddess Irina 1 Music Show, F Lost Discs Radio Show, A The Real Amateur Radio Show; **2330 W** World of Radio, H Steppin' Out of Babylon, A Fred Flintstone Music Show.
9335 kHz.: **2330 A** Bluegrass Gospel.

WHRI, Indiana

7580 kHz.: **2302 A** 20 The Countdown Magazine (to 0100); **2305 M-F** For the People (populist phone-in), A Music (Christian contemporary/gospel).
9495 kHz.: **2305 A** Music (Christian contemporary/gospel).

WWCR, Tennessee

5070 kHz.: **2305 W/F** Golden Age of Radio Theatre.

Thank You ...

Additional Contributors to This Month's Short-wave Guide:

Harold Frodge, Midland, MI; Alokesh Gupta, New Delhi, India; Glenn Hauser, Enid, OK; Adrian Sainsbury, Radio New Zealand Intl; Harold Sellers, Robert E. Thomas, II, Bridgeport, CT; Larry Van Horn, Brasstown, NC; *BBC On Air; BCL News; BCDXC; Cumbre DX; DXA; DX Listening Digest; DX Ontario; Fineware; Hard Core DX; HFCC; ILG; NASWA; World of Radio; Worldwide DX Club.*

Great Expectations

Stand by your receivers – the latest NOAA weather satellite is about to hit the airwaves. The launch of a new WXSAT is always a cause for celebration in the satellite-monitoring community. Back on April 1st, the Titan II booster that will launch NOAA-M into orbit, was erected at Vandenberg Air Force Base. The spacecraft's pre-transfer review was held on April 16-17th, and, following shipment, arrived at the launch site on April 25. As I write, the spacecraft is scheduled to be mated to the booster at the end of May; there is a "dress rehearsal" scheduled for mid-June, and launch is timed for 1122a.m. PDT on June 24.

NOAA-M is the latest in the advanced TIROS-N (ATN) series built by Lockheed Martin Space Systems Company (LMSSC). The monitoring instruments carried on the spacecraft will support imaging and measurements of the Earth's atmosphere, surface and cloud cover, including radiation, and atmospheric ozone. The measurement of proton and electron flux at orbit altitude is of particular interest to aurora watchers because these satellites can provide early warning of solar flare activity. As with earlier satellites in the series, remote platform data collection and Search and Rescue Satellite Aided Tracking (SARSAT) packages are also carried.

The primary instruments on NOAA-M have been designed for a three-year mission:

Advanced Very High Resolution Radiometer (AVHRR/3)

This is the main package for producing the imaging transmissions used by hobbyists. It is basically an astronomical telescope where the image is viewed by a radiometer rather than by eye or camera. The unit (AVHRR) measures reflected solar (visible and near-infrared) energy and radiated thermal (infrared) energy from land, sea, clouds, and atmosphere. The data is used to provide snow, ice, and cloud discrimination, sea surface temperatures, and vegetation conditions.

The output from the AVHRR consists of six channels containing image data that has a nominal resolution of 1.1km at nadir (the point immediately below the spacecraft). Five of these channels are transmitted as high resolution picture transmission (HRPT) data in the 1700 MHz band; the sixth channel is called 3A and is the

1.6 micron band that provides improved detection of cloud, ice and snow. This channel is time-shared with the original fifth channel in the 3.7 micron band (now called 3B). Two of the channels are transmitted as low resolution APT (automatic picture transmission) in the 137 MHz band.

High Resolution Infrared Radiation Sounder (HIRS/3)

This sounder measures scene radiance in the infrared spectrum. Data is used in conjunction with the Advanced Microwave Sounding Unit (AMSU) instruments, to calculate the atmosphere's vertical temperature profile from the Earth's surface up to about 40km altitude. The data is also used to determine ocean surface temperatures, total atmospheric ozone levels, the amount of precipitable water, cloud heights and coverage, and surface radiance.

Advanced Microwave Sounding Unit-A and B (AMSU-A and B)

The AMSU-A measures radiance in the microwave spectrum. The data is used to provide precipitation and surface measurements including snow cover, sea ice concentration, and soil moisture. Microwave sensing permits such measurements even in the presence of clouds. The AMSU-B also measures scene radiance in the microwave spectrum. The data from this instrument is used to calculate vertical water vapor profiles from the Earth's surface to about 12km.

Solar Backscatter Ultraviolet Radiometer (SBUV/2)

The SBUV/2 measures solar irradiance and Earth radiance (backscattered solar energy) in the near ultraviolet spectrum. The data is used

to derive the global ozone concentration in the stratosphere, the vertical distribution of atmospheric ozone, the long-term solar spectral irradiance, the photochemical processes and the influence of trace constituents on the ozone layer.

◆ Current NOAA's

NOAA-M (NOAA-17 when in orbit) joins a constellation of active WXSATs that are in various states of operational efficiency. NOAA-16 is the prime afternoon WXSAT and it is expected to continue in this role, although it provides no APT due to a faulty switch. NOAA-15 is the prime morning WXSAT, which, after fixes derived by the Operations staff, continues to provide both APT and HRPT. NOAA-14 and NOAA-12 have both suffered from orbital drift, in that they were originally placed in afternoon and morning orbits but have drifted later and earlier respectively.

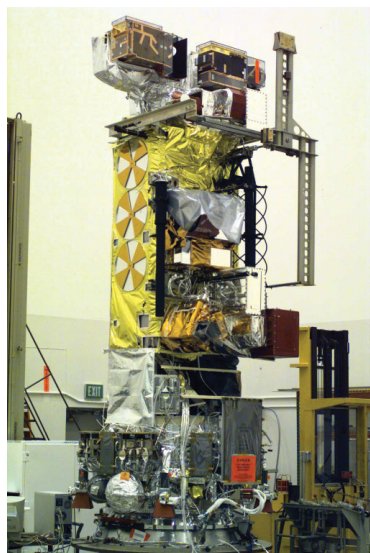


Fig 1. NOAA M1

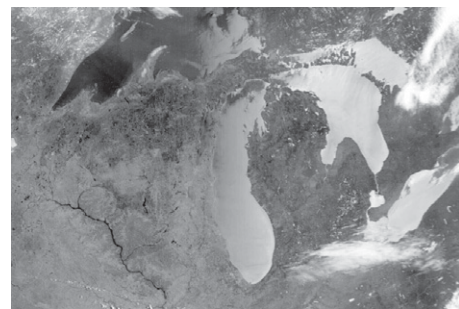


Fig 2. Chuck Vaughn's image of the Great Lakes

Both NOAA-12 and NOAA-14 have instrument problems. On NOAA-12, the MSU and HIRS (see previous notes) have failed, and NOAA-14's SARP (Search and Rescue Processor) has failed. NOAA-M is eagerly awaited!

Meteor 3-5 has continued to provide daytime imagery (on 137.30 MHz) but its infrared scanner failed many years ago, leaving it to transmit only during the sunlight part of each orbit. I can find no hint (on Russian web sites) of an early replacement.

Frequencies

NOAA-M (17): listen on 137.50 MHz
 NOAA-14 transmits APT on 137.62 MHz
 NOAA-12 and -15 transmit APT on 137.50 MHz
 Meteor 3-5 may transmit APT on 137.30 MHz when in sunlight
 Meteor 2-21 may transmit APT on 137.85 MHz when Meteor 3-5 is off.
 GOES-8 and GOES-10 use 1691 MHz for WEFAX

Satellite Service Guide



Robert Smathers

roberts@nmia.com

www.monitoringtimes.com/mtssg.html

All Frequencies MHz

SES Americom Americom-6

C-Band - 72 degrees West longitude

1(V)	3720	Data Transmissions
2(H)	3740	Data Transmissions
3(V)	3760	(none)
4(H)	3780	(none)
5(V)	3800	(none)
6(H)	3820	(none)
7(V)	3840	(none)
8(H)	3860	(none)
9(V)	3880	(none)
10(H)	3900	(none)
11(V)	3920	Data Transmissions
12(H)	3940	(none)
13(V)	3960	(none)
14(H)	3980	(none)
15(V)	4000	(none)
16(H)	4020	(none)
17(V)	4040	(none)
18(H)	4060	(none)
19(V)	4080	(none)
20(H)	4100	(none)
21(V)	4120	(none)
22(H)	4140	(none)
23(V)	4160	(none)
24(H)	4180	La Cadena de Milagro - Spanish-language religious network

SES Americom Americom-6

Ku-Band - 72 degrees West longitude

1(V)	11720	Data Transmissions
2(H)	11740	Data Transmissions
3(V)	11760	Data Transmissions
4(H)	11780	Data Transmissions
5(V)	11800	(none)
6(H)	11820	Data Transmissions
7(V)	11840	Data Transmissions
8(H)	11860	Occasional video
9(V)	11880	(none)
10(H)	11900	Data Transmissions
11(V)	11920	Data Transmissions
12(H)	11940	Data Transmissions
13(V)	11960	Data Transmissions
14(H)	11980	(none)
15(V)	12000	Data Transmissions
16(H)	12020	Data Transmissions
17(V)	12040	(none)
18(H)	12060	(none)
19(V)	12080	(none)
20(H)	12100	(none)
21(V)	12120	AMC-6 ID Slate
22(H)	12140	Occasional video
23(V)	12160	Data Transmissions
24(H)	12180	Data Transmissions
25(V)	11535	South-American beamed
26(H)	11535	South-American beamed
27(V)	11655	South-American beamed
28(H)	11655	South-American beamed

Panamsat Galaxy 6

C-Band - 74 degrees West longitude

1(H)	3720	(none)
------	------	--------

2(V)	3740	(none)
3(H)	3760	(none)
4(V)	3780	(none)
5(H)	3800	(none)
6(V)	3820	(none)
7(H)	3840	(none)
8(V)	3860	(none)
9(H)	3880	(none)
10(V)	3900	(none)
11(H)	3920	(none)
12(V)	3940	(none)
13(H)	3960	(none)
14(V)	3980	(none)
15(H)	4000	(none)
16(V)	4020	(none)
17(H)	4040	(none)
18(V)	4060	(none)
19(H)	4080	(none)
20(V)	4100	(none)
21(H)	4120	Data Transmissions
22(V)	4140	Data Transmissions
23(H)	4160	(none)
24(V)	4180	(none)

Panamsat SBS-6

Ku-Band - 74 degrees West longitude

T01(H)	11725.0	Data Transmissions / Group W Network Services (digital)
T02(V)	11749.5	CONUS Communications (half-transponders; analog and digital)
T03(H)	11774.0	CONUS Communications (half-transponders; analog and digital)
T04(V)	11798.5	Occasional video
T05(H)	11823.0	CONUS Communications (half-transponders; analog and digital)
T06(V)	11847.5	Occasional video
T07(H)	11872.0	Occasional video
T08(V)	11896.5	Occasional video
T09(H)	11921.0	Occasional video
T10(V)	11945.5	CONUS Communications: CONUS Select, All News Channel, CONUS IFB, commercial-free and multi-format music (digital)
T11(H)	11970.0	Occasional video
T12(V)	11994.5	MSNBC feeds (digital)
T13(H)	12019.0	Occasional video
T14(V)	12043.5	Occasional video
T15(H)	12068.0	Data Transmissions
T16(V)	12092.5	Occasional video
T17(H)	12110.0	Occasional video
T18(V)	12141.5	Occasional video
T19(H)	12166.0	Occasional video

Hughes Global Systems HGS-5

Ku-Band - 77 degrees West longitude

T01(H)	11725	(none)
T02(H)	11774	(none)
T03(H)	11823	(none)

T04(H)	11872	(none)
T05(H)	11921	(none)
T06(H)	11970	(none)
T07(H)	12019	(none)
T08(H)	12068	(none)
T09(H)	12117	(none)
T10(H)	12166	(none)

SES Americom Satcom C1

C-Band - 79 degrees West longitude

1(H)	3720	(none)
2(V)	3740	(none)
3(H)	3760	(none)
4(V)	3780	(none)
5(H)	3800	(none)
6(V)	3820	(none)
7(H)	3840	(none)
8(V)	3860	(none)
9(H)	3880	(none)
10(V)	3900	(none)
11(H)	3920	(none)
12(V)	3940	(none)
13(H)	3960	(none)
14(V)	3980	(none)
15(H)	4000	(none)
16(V)	4020	(none)
17(H)	4040	(none)
18(V)	4060	(none)
19(H)	4080	(none)
20(V)	4100	(none)
21(H)	4120	(none)
22(V)	4140	(none)
23(H)	4160	(none)
24(V)	4180	(none)

SES Americom Americom-5

Ku-Band - 79 degrees West longitude

1(V)	11730.0	Data Transmissions / Utah State University (digital)
2(H)	11743.0	Data Transmissions
3(V)	11791.0	Data Transmissions
4(H)	11804.0	Oklahoma Educational TV (digital) / Empire Sports Network (digital)
5(V)	11852.0	CBS feeds (analog and digital)
6(H)	11865.0	Occasional video
7(V)	11913.0	Data Transmissions
8(H)	11926.0	Occasional video
9(V)	11974.0	ABC feeds (analog and digital)
10(H)	11987.0	ABC feeds (analog and digital)
11(V)	12035.0	CNN feeds (analog and digital)
12(H)	12048.0	Occasional video
13(V)	12096.0	Occasional video
14(H)	12109.0	Occasional video
15(V)	12157.0	Data Transmissions
16(H)	12170.0	New York Network (digital) / Occasional video

Listening to the Feds on HF

Over the last few years we have seen what appears to be renaissance in high frequency usage by the federal government. It now seems like all sorts of federal agencies are jumping on the HF bandwagon. And, given the current state of world affairs, monitoring the Feds on HF might not be a bad idea.

This month's *Fed Files* profile (Table 1) is a quick reference guide to listening to government communications in the shortwave radio spectrum. All of the 175 frequencies in this list are in kHz and the predominant mode is upper sideband (USB) and Automatic Link Establishment (ALE).

Table 1: MT's Government Agency HF Frequency Reference List

Air Force MARS	3311.0	4455.0	4490.0	4590.0
	7302.0	7540.0	13993.0	
Air Force Reserve	4341.0	8495.0	11470.0	
	11816.0			
Army 1111 th Signal Battalion (WAR46)	4018.5	4024.5		
	5761.5	7309.5		
Army 1 st USA, Atlanta, GA	8048.5	10797.5	16318.5	
	17478.5			
Army 44 th Med BDE, Fort Bragg, NC	6997.5	13996.0		
	14488.5	14665.0		
Army Corps of Engineers	6785.0	11693.5	12070.0	
	16327.4			
Army MARS	3347.0	6996.0	13996.0	14487.0
Army National Guard	4001.5	4035.0	4240.0	4244.5
	4250.0	4296.0	4435.0	4441.5
	4520.0	4580.0	4607.0	4610.0
	4780.0	4837.0	4860.0	4927.5
	4960.0	5045.0	5087.0	5203.5
	5205.0	5215.5	5429.0	5432.5
	5821.5	6010.0	6766.0	6907.0
	6910.5	6992.0	7361.0	8038.5
	8047.0	8055.0	8056.0	8158.5
	8180.0	8161.5	8622.0	9357.0
	12670.0	13722.0	14350.0	14653.0
	20906.0			
Civil Air Patrol	2371.0	2374.0	4466.0	4469.0
	4506.0	4509.0	4582.0	4585.0
	4601.0	4604.0	4627.0	4630.0
	5211.0	7635.0	14396.0	14902.0
Coast Guard	4048.5	7528.5	10815.0	14930.0
Customs Service	8912.0	11494.0		
Defense Information Systems Agency	10819.0	11075.0		
	16320.0	17520.0		
Defense Logistic Agency	5063.5	11576.5	17458.5	
	24740.0			
Department of Agriculture	5901.0	9270.0	11494.0	
	14955.0			
Department of Energy	7428.0	18416.0		
Department of the Interior	3253.0	4863.0	5287.5	5380.0
	6766.0	7880.0		
Department of Justice	7672.0	10401.5	14541.0	
	18220.0			
Department of State	4553.6	6902.6	13503.6	
	20810.6			
Department of Veterans Affairs	5038.5	7362.5		
	12076.0	23355.5		
Director of Military Support	13722.0	14350.0	14402.0	
	20906.0			
Drug Enforcement Administration	7657.0	11073.5		
	14686.0	19131.0		
Environmental Protection Agency	3360.0	4990.0		
	6821.0			
Federal Aviation Administration	4055.0	6870.0		
	7475.0	7611.0	8125.0	11288.0
	11637.0	13312.0		
	13457.0	15851.0	19410.0	24550.0
Federal Bureau of Investigation	5058.5	7903.5		
	14493.5			
Federal Communications Commission	4481.5	7788.5		
	10653.5	14969.5		
Federal Emergency Management Agency	5211.0	10493.0		
Federal Highway Administration	4821.0	5255.0		
	7419.5	9197.0	10891.5	
General Services Administration	2301.0	22862.6		
	25342.6	27550.0		
Health and Human Services	3205.0	4017.0		
	4885.0	5302.0		
Immigration and Naturalization Service	5912.5	9435.0		
	14585.0	24838.5		
Maritime Administration	5255.0	7419.5	9197.0	10891.0
Marine Corps Mountain Warfare Training Center	5031.5			
	10179.5			
MITRE Corporation	4952.0	12165.0	20873.0	
National Aeronautics and Space Administration	3385.0			
	6982.5	14455.0		
National Coordination Center for Telecommunications	6780.6			
	10586.5	13804.0	18932.0	
Navy-Marine Corps MARS	4041.0	7381.0	14383.5	
Navy Research Laboratory	3221.0	7107.0	11625.0	
	17615.0			
Navy SPAWARSSCEN	6427.0	8689.0	12687.0	
	18738.0			
NCS Auxiliary HF Radio Program	2300.6	6845.0		
	15613.0	22865.6		
NCS Regional Managers HF Network	6765.0	9068.6		
	11448.0	13800.0		
NCS National Telecommunications Coordination Network-HF (NTCN-HF)	4481.5	5099.1	6767.0	7480.1
	7552.1	7788.5	9064.0	10653.5
	11432.0	11451.0	14969.5	18036.0
	18936.6			
National Disaster Medical System	3205.0	4017.0		
	4885.0	5302.0		
National Telecommunications and Information Administration (NTIA)	9973.0	13423.0	18178.5	
Transportation Command	5300.5	9120.5	11628.5	
	12057.0	20994.0		
Urban Search and Rescue	3205.0	4017.0	4885.0	5302.0

Monitoring Los Angeles

This month we profile government communication frequencies in the nation's second largest city – Los Angeles. Remember, these area profiles are not meant to be complete, but they are a representative survey of what frequencies are available in each area and are based on the best information we have from open sources. I strongly urge our readers in the areas we profile to please send us updates. We cannot personally visit every area we cover in this column, so I am relying on those of you who live in the areas we profile to update us on what you are hearing. Chicago, Houston, and Philadelphia are next on the docket.

We will not cover any Department of Defense (DoD) frequencies in these profiles. Complete nationwide coverage of those frequencies are now available for purchase in the Grove Military Directory CD-ROM – *Grove Military Frequency Directory*. You can find out more information about that product on the Grove website at <http://www.grove-ent.com>

HF (frequencies kHz, single sideband)

Federal Aviation Administration	3354.0	4055.0
	4060.0	7475.0
Federal Bureau of Investigation	2810.0	4991.0
	5060.0	5390.0
	7905.0	9185.0
	9240.0	9313.0
	10500.0	10915.0
	11076.0	12140.0
	14460.0	

VHF/UHF (frequencies MHz, narrowband FM)

Animal and Plant Health Service	412.400	415.450
Bureau of Alcohol, Tobacco and Firearms	169.250	170.200
	173.8875	
Bureau of Prisons	170.650	170.875
	170.925	409.250
Department of Commerce	166.150	169.075
Department of Energy	409.500	
Department of Labor	172.300	406.200
Department of Veteran Affairs	155.340	164.175
	164.500	168.000
	168.525	168.575
	169.250	171.3875
	406.325	409.325
	409.400	419.150
Federal Aviation Administration	162.300	164.725
	165.6625	165.7625
	169.275	169.350
	172.825	172.950
	409.025	
Federal Bureau of Investigation	167.3375	167.3625
	167.4875	167.5375
	167.5625	167.6375
	170.025	170.825
	170.950	173.100
	173.125	173.175
Federal Emergency Management Agency	173.7875	
Federal Reserve System	409.525	413.925
	416.100	
General Services Administration	415.200	417.200
	417.250	417.425
	419.175	
Immigration and Naturalization Service	162.825	162.850

162.875	162.975	163.625	163.675	163.750
165.825	165.875	165.975	168.825	168.875
168.900	168.950	168.975	408.250	417.025
Internal Revenue Service	165.950	166.000	414.700	
415.725	418.175	418.225		
Marshal Service	162.7215	162.7875	163.200	
163.8125	170.750	170.800	170.850	411.000
411.050	411.100	412.650	412.700	417.700
National Weather Service	165.4625	410.575	416.375	
Secret Service	164.400	164.650	164.8875	
165.2125	165.375	165.5125	165.6875	165.7875
166.400	414.850	415.650		
Soil Conservation Service	172.275			
Treasury Common	166.4625			
White House Communications Agency	162.6875	171.2875		
US Customs Service	165.2875	166.4375	169.250	
170.200				
US Information Agency	406.575	406.625	406.725	
410.000	410.025	410.200	412.025	412.375
416.5375	416.6125	416.6875	419.125	
US Post Office	162.225	163.375	164.600	
164.9625	166.225	169.000	169.375	169.850
170.125	170.600	173.8375	173.9375	406.725
406.775	408.050	409.275	410.325	413.600
414.750	415.050	416.775	418.100	418.300

LA FAA Air Traffic Control Frequencies

As part of our metro profiles I will also include FAA Air Traffic Control allocated frequencies for the major airports in the area we are covering. In the Los Angeles area there are three major airports: Los Angeles International, Ontario International, and Van Nuys Airport.

Los Angeles International Airport (KLAX)

ATIS	133.800 (Arrival)	135.650 (Departure)
Clearance Delivery	120.350	121.400 327.000
Los Angeles Ground	121.650 (North Complex)	121.750 (South Complex) 327.000
Los Angeles Tower	119.800 (Helicopters)	120.950 (South Complex) 133.900 (North Complex) 239.300 (North Complex and Helicopters) 379.100 (South Complex)
Unicom	122.950	
Emergency	121.500	243.000
SOCAL Approach	124.300 (Approach from West/Departure to West)	124.500 124.900 128.500
SOCAL Departure	124.300 (Approach from West/Departure to West)	125.200
SAMSO Flight Operations	372.200	
Special Flight Rule Area	128.550	

Ontario International Airport (KONT)

ATIS	124.250
Clearance Delivery	118.100
Ontario Ground	121.900 257.800
Ontario Tower	120.600 385.600
Emergency	121.500 243.000
SOCAL Approach/Departure	119.650 (NE-East) 125.500 (SW-North) 127.250 (North-NE) 134.000 (East-South) 135.400 (South-SW)

Van Nuys Airport (KVNY)

ATIS	118.450
Clearance Delivery	126.600 239.0
Van Nuys Ground	121.700
Van Nuys Tower	119.300 120.200 239.000
Unicom	122.950
Emergency	121.500 243.000

Air National Guard Operations	303.000
Helicopter Operations	119.0000
SOCAL Approach/Departure	120.400 124.600 134.200 135.050

◆ US Customs Service

In 1984, the U.S. Customs Service developed a high frequency radio network, code-named COTHEN (Customs Over The Horizon Enforcement Network). Using a combination of radios, the computer, and a tactical voice privacy unit, they developed a sophisticated radio network.

COTHEN's first fixed station transmitter near Memphis, Tennessee, became operational in 1985. The Blue Lightning Operations Center was the first command office, and its marine vessels were the first tactical platforms to have COTHEN radios. This initial deployment proved so successful that COTHEN grew to include all U.S. Customs aircraft.

High powered fixed station transmitters located across the United States are connected to Customs' Air, Marine, and Special Agent In Charge (SAIC) locations via dedicated telephone lines. Interdiction platforms that are equipped with a COTHEN radio can place a call to any other platform or office in the network.

COTHEN currently provides communications support for more than 235 aircraft, marine interdiction vessels, command offices, and numerous allied agencies including the U.S. Coast Guard, Drug Enforcement Administration, Border Patrol, Army, Navy, and Joint Interagency Task Forces. The COTHEN and TSC team responsible for on-the-air technical support is headquartered at the Communication Management Division's National Law Enforcement Communications Center in Orlando, Florida. Among the unique capabilities of this system are TRICS, TRACS, and DARK.

TRICS (Telephone to Radio Interface Communications System) is a computer-controlled voice-encrypted telephone patch. TRACS (Tracking and Communications System) provides encrypted position reporting, including latitude, longitude, speed, heading, time, and date. DARK (Dual Algorithm over the Air ReKeying) provides the rekeying of radio encryption equipment without user assistance regardless of the user's location.

COTHEN uses two types of Automatic Link Establishment (ALE) systems. While there is no known decoder for hobbyists of the Rockwell ALE system, they can decode the other system using Charles Brian ALE decoder available at URL: <http://www.chbrain.dircon.co.uk/> or from MT's *Utility World* website.

Here are some ALE addresses, both known and unknown, and the associated frequencies recently monitored on this system.

Frequencies (kHz/USB mode):

5732.0	Scan 1
7527.0	Scan 2
8912.0	Scan 3

10242.0	Scan 4
11494.0	Scan 5
13907.0	Scan 6
15867.0	Scan 7
18594.0	Scan 8
20890.0	Scan 9
23214.0	Scan 10
25350.0	Scan 11

Known ALE Addresses

CS1	Customs Service Center, Atlanta, Georgia remote
CS2	Customs Service Center, Memphis, Tennessee remote
CS3	Customs Service Center, Oklahoma City, Oklahoma remote
CS4	Customs Service Center, Lovelock, Nevada remote
CS5	Customs Service Center, Wilmington, North Carolina remote
CS6	Customs Service Center, Kansas City, Missouri remote
CS7	Customs Service Center, Denver, Colorado remote
CS8	Customs Service Center, Albuquerque, New Mexico remote
CS9	Customs Service Center, Beaufort, South Carolina remote
JOE	Customs Service Center, Marion, Iowa
MC2	Oklahoma City, Oklahoma
MC3	Las Vegas, Nevada
PR1	San Juan, Puerto Rico
TRC	Customs Service Center, Orlando, Florida < Tentative >
TSC	Customs Service Center, Orlando, Florida < Tentative >
TST	Customs Service Center, Orlando, Florida (Monitored on SHARES frequencies)

Delta ALE Addresses: D07 D14 D23 D42 D43 D44 D48P D49 D95

Foxtrot ALE Addresses: F12 (Voice ID "Jackknife") F33

India ALE Addresses: I08 I37 I54 I57P I62

Juliet ALE Addresses: J03 (possible USCG aircraft)

Romeo ALE Addresses: R10 R12 R14 R15P R64

Sierra ALE Addresses: S18 S32 (Possible voice ID "Ramjet")

Other ALE addresses recently seen: 2KN 543P 738 768 AAA
AR1P CCC FL1 GW1 I3L LM2 MR1 MV2P MV7P NW1
RAY RJS TSC3 TSTL3T U9N WH9

Additions and corrections for material in this column are always appreciated and can be sent to the email address in the masthead. Next month we will explore Fed monitoring in the Chicago area. Until then 73 and good hunting.

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AOR's APCO-25 Decoder

As more state and local public safety agencies move to digital trunked radio systems, the demand for scanners that can decode digital transmissions continues to increase. The most common digital system being fielded in the United States is based on the APCO (Association of Public-Safety Communications Officials International, Inc.) Project 25 suite of standards. At the beginning of this year Uniden announced a pair of scanners, the BC250D handheld and BC785D base/mobile, that will accept a decoder card and deliver APCO-25 voice transmissions. These two scanners are expected to be available at the end of the year, but by that time there may be another option.

At the 2002 Dayton HamVention in May, AOR unveiled a working prototype of their new APCO Project 25 decoder. Dubbed the ARD5000, this device takes a 10.7 MHz intermediate frequency (IF) signal from a receiver and provides decoded audio from a built-in speaker. The prototype also has a data-out jack that is programmed to provide a serial data stream from the received signal. A front panel display shows received signal information and allows the selection of different operating modes.

At the show a spokesman indicated that the unit had been in development for about six months and that it would be another six months or so until it was in production. The final form factor is still subject to change, but will probably end up being roughly the size of a hard-back textbook. No decisions on price had been made yet, either.

Many high-end receivers, including the

AOR AR5000, ICOM R8500 and Yaesu VR-5000, provide a 10.7 MHz IF output. This output comes from an intermediate point in the receiving process and has a relatively wide bandwidth, allowing for easier signal demodulation via a DSP (Digital Signal Processor). This output is often used in conjunction with spectrum display units, but not typically for data decoding. The AR5000, for instance, can provide as much as 10 MHz worth of bandwidth (everything from 5 MHz below the tuned frequency to 5 MHz above) out of the 10.7 MHz IF connector. Since a typical public safety channel will be 12.5 kHz or 25 kHz wide, as many as 800 channels can be simultaneously delivered to a decoder without retuning the receiver.

The DSP in AOR's decoder takes the wideband signal and digitally selects the individual channel of interest, decoding the APCO-25 signaling and directing the audio to an IMBE (Improved Multi-Band Excitation) vocoder. See the June 2000 *Tracking the Trunks* column or my website for more details about APCO-25 voice signals.

The ARD5000 is designed to be a "black box" decoder primarily for government, public safety, and the news media. AOR anticipates that government agencies will also have the ability to add their own cryptographic keys to the unit, enabling it to internally decrypt voice and data traffic.

◆ South Dakota

I'm in South Dakota and my state is investing \$30 million in a Motorola trunked system on a 150 MHz frequency. Officials claim that because of the frequency, we won't have the same problems other states and cities have experienced. Do you agree?

First, some background. Last year South Dakota contracted for a statewide Motorola SmartZone system to operate in the 150 MHz (VHF, Very High Frequency) band, controlled out of the state capitol, Pierre. The state hopes to replace the patchwork of incompatible radio systems that are currently op-

erated by different state and local public safety agencies. South Dakota has experienced firsthand the problems that arise during an emergency when police, fire and medical personnel can't talk to each other. A large tornado four years ago and recent forest fires have all shown that a common, compatible radio system is needed.

The new system is designed to handle up to 48,000 users and 2,000 talkgroups through more than 30 repeater sites. Besides voice and control channels, each site will also have a channel dedicated to digital data operating at 9600 bits per second (bps). The anticipated use for this channel will be the standard mobile data terminal (MDT) functions, such as driver's license and vehicle registration checks.

A mutual aid channel will also be available at each site, although it will operate in conventional mode rather than trunked. This will allow existing 150 MHz radios to access each repeater when necessary.

The State will maintain each of the repeater sites and the central trunking controller in the capitol. Each participating agency will be responsible for the maintenance and repair of its own mobile and portable radios as well as any dispatch consoles and connection equipment.

Motorola expects that 95 percent of the state can be covered, although the governor's office is saying 90 percent. The existing Department of Transportation system has several gaps, but the addition of more than a dozen new sites has given the state confidence that most areas will have mobile coverage from vehicle-mounted radios. Coverage for portable (handheld) radios may be more of challenge since they operate with lower transmit power and are used inside buildings and other structures that may block reception.

An option for additional portable coverage would be an *extender radio* installed in a vehicle. This device will allow a UHF (450 MHz) or 800 MHz portable radio to be used on the 150 MHz trunked system by receiving transmissions from the portable and rebroadcasting them on the 150 MHz system, and, similarly, receiving 150 MHz signals and transmitting them out to the portable. Typical ranges for extender radios can be up to one mile.

Other cities and states have experienced problems with their new 800 MHz trunked radio systems. The state of Delaware, the cities of Honolulu, Hawaii, and Washington, D.C., as well as others, have experienced a number of



potentially life-threatening failures, many of which seem to be related to lack of geographic coverage. In a typical scenario, radio users in urban areas are unable to communicate when inside buildings or other places where radio signals might be blocked.

All other things being equal, a system operating at 150 MHz should have better penetration into buildings and other structures than 800 MHz, but that's not the only factor necessary for an effective radio system. Other cities and states have also had problems stemming from inadequate user training, lack of sufficient system testing, bugs in the trunking control software and cost-cutting measures that affected performance. Any new system is going to have problems—the issue will be whether South Dakota has the money and the patience to plan for resolving each of the problems as they occur.

◆ Nevada

The State of Nevada operates a trunked radio system in the 150 MHz band, primarily for the Highway Patrol, the Fire Marshall, and state executives. It's a Motorola Type II system with 16 repeater sites clustered near Las Vegas and Reno. Outside of these areas the system appears to be conventional operation on three frequencies. Trunked frequencies include 151.055, 151.100, 151.085, 151.115, 151.130, 151.145, 151.265, 151.400, 153.920, 154.025, 154.310, 154.755, 154.695, 154.920, 155.460, 155.565 and 155.850 MHz. Reno dispatch is using talkgroup 20816 (hex 515). Las Vegas has two dispatch talkgroups, one for north of Sahara Avenue (16048, hex 3EB) and another for south (16080, hex 3ED).

Several Las Vegas hotels and casinos also operate conventional systems in the 150 MHz band.

◆ Ohio

By the 4th of July holiday, more than a dozen Ohio counties should be linked into the new statewide Multi-Agency Radio Communications System (MARC), a \$328 million APCO-25 compliant trunked radio system operating in the 800 MHz band. Voice and telephone interconnect will be served from 201 repeater sites, and a separate 800 MHz data system will connect in-vehicle laptop computers to state and national databases. Police cruisers will also be equipped with Global Positioning System (GPS) receivers and report their exact position via automatic vehicle location (AVL). The system is planned to cover more than 97 percent of the state and is expected to be complete in about two years.

Like South Dakota, Ohio currently has a patchwork of incompatible radio systems, leading to difficulties in communication during disasters and other mutual aid emergencies.

Besides the Ohio State Police and various county police and fire departments, other agencies using the system will include the State Fire Marshall, Natural Resources and Environmental Protection, Rehabilitation and Correction

(prisons), Public Utilities and the Ohio Turnpike Commission. One good source for detailed information about this complex system is on Tom Swisher's (WA8PYR) web site at <http://www.qsl.net/wa8pyr/marcs.htm>.

◆ Michigan

If you're in the Upper Peninsula of Michigan and you see a sport-utility vehicle full of radio gear driving slowly down the road, it may be part of the State Police communications division testing the coverage and audio quality of their new 800 MHz state-wide trunked radio system. For these tests the UP has been divided into two-mile grid squares, and the SUV traverses public and private land in each square checking reception to the nearest repeater site.

The entire state is scheduled to be in operation by September.

◆ Antennas

Getting a good signal into your scanner is the first step in successful monitoring. In many cases the "rubber duckie" antenna that comes with a handheld scanner is a rather poor performer. Third-party replacements can often improve reception and help pull in weak and distant transmissions. I'd be interested in hearing from readers about antennas that they've found to work better than the standard issue, but in the meantime here are a few to mention:

The Diamond RH77CA is a 15-inch antenna with very good performance in the 150 MHz and 450 MHz bands, and has a fair amount of gain up through 900 MHz. It lists for \$24.95, although a little shopping around can save you a few dollars. This antenna has received a number of good reviews and is recommended by many scanner users.

Radio Shack recently began selling an improved 9-inch antenna, catalog number 20-



034, for \$16.99. Reports indicate that a new shipment of these antennas outperforms the old ones, with excellent performance in the 800 MHz band.

For monitoring in the 800 MHz band I've used Max 800 antennas from Max Systems. They work very well in the 800 MHz and 900 MHz bands, which is what they're designed for, but not well on lower frequencies. The portable antenna retails for about \$30.

Optoelectronics sells several antennas including the RD800, which is designed for solid performance between 500 MHz and 1000 MHz (1 GHz). They also sell the DB32, which is a low-profile 3-inch VHF and UHF antenna that is much less noticeable than the longer antennas but has somewhat diminished gain. Optoelectronics is also working with Comet Antenna and will soon offer an antenna that will have good performance beyond 1 GHz, primarily for use with their Digital Scout. I'll have more on that in a future column.

Let me know what your antenna and other equipment choices via electronic mail at dan@signalharbor.com. My website at <http://www.signalharbor.com> also contains links and further information about scanning and trunked radio systems. Until next month, happy monitoring!

NOTICE: It is unlawful to buy cellular-capable scanners in the United States made after 1993, or modified for cellular coverage, unless you are an authorized government agency, cellular service provider, or engineering/service company engaged in cellular technology.

Full 800 MHz Scanners

AOR AR-8200MKII
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Robins Air Force Base, Georgia

Roland R. "Mac" McCormick III recently took a trip to Robins AFB, Georgia, and did some monitoring of their 400 MHz trunk system. Mac said he was surprised to find that the base military police weren't on the trunk system, but he found them still on their old VHF repeater system — 38.025 output/140.425 input (no PL or DPL noted).

Robins AFB Trunked Repeater System

System: Motorola

Frequencies: 406.350 406.750 407.150 407.950 408.200 408.750 409.150 409.500 409.550

Base Frequency: 406.000 MHz, Offset: 25 kHz

Talkgroups	User/Description
624	Unknown
944	Unknown: "are you up in the tower?" "come back to shop by 0945"
1072	Unknown
1232	Unknown
1424	Unknown
1552	Unknown: discussion ref "reception in rotunda"
1648	93rd Air Control Wing — tentative
1712	93rd Air Control Wing — tentative
3248	Unknown: "Have HYDRA come on out"; "radar display not readable"
3280	Unknown
3312	Unknown
3440	Unknown
3472	Unknown
3504	Unknown: Training 1 calling CE 2; Engineering 1 calling EOD 2
4880	Warner Robins Air Logistics Center (ALC) — tentative
4912	Warner Robins Air Logistics Center (ALC) — tentative
4944	Warner Robins Air Logistics Center (ALC) — tentative
4976	Warner Robins Air Logistics Center (ALC) — tentative
5008	Warner Robins Air Logistics Center (ALC) — tentative
5072	Warner Robins Air Logistics Center (ALC) — tentative
5136	Warner Robins Air Logistics Center (ALC) C-130 aircraft maintenance — tentative
5264	Warner Robins Air Logistics Center (ALC) — tentative
5296	Warner Robins Air Logistics Center (ALC) — tentative
5328	Warner Robins Air Logistics Center (ALC) — tentative
5360	Warner Robins Air Logistics Center (ALC) — tentative
6448	Unknown
6576	19th Air Refueling Group — tentative
6608	19th Air Refueling Group — tentative
11312	Supply
11344	Unknown
11376	Unknown
11408	Unknown
11536	Unknown
12816	Crash/Fire

To fill in the rest of our profile at Robins AFB, here is material from the *Grove Military Frequency Directory*, first edition on CD-ROM.

118.950	Approach Control — Atlanta ARTCC
119.475	ATIS
119.600	Macon Approach/Departure Control

121.850	Ground Control
124.200	Macon Approach/Departure Control
124.800	Macon Approach/Departure Control
126.200	Tower
127.725	ATIS
134.100	Dispatcher
134.500	Approach/Departure Control — Atlanta ARTCC
138.025	Law Enforcement — repeater input (output 140.425)
138.075	OSI
138.125	Maintenance
138.175	OSI
138.275	Maintenance AGE Net
138.375	Simplex Administrative Net
138.425	Unidentified Net
138.500	Maintenance AGE Net
138.875	Supply Net
138.925	Fire Alarm System - data
139.625	Security Police
139.650	Energy Control System - data
139.675	Security Police
139.725	Security Police
139.800	Security Police
140.100	Maintenance Expeditors — repeater output (input 138.600)
140.725	Unidentified air-to-ground
142.150	Air Force MARKS
142.300	Command Net — repeater output (input 138.475)
142.675	Paging System
143.425	Unidentified air-to-ground
143.450	Air Force MARKS
148.475	Mobility Net
148.525	Training Net
149.200	POL Trucks Dispatch Net
149.325	Munitions Net
149.525	Maintenance - possibly 116BW
149.550	Command Net — repeater output (input 148.050)
150.150	Maintenance - possibly 116BW
150.300	Maintenance - possibly 116BW
163.4125	Army Corps of Engineers Construction
163.4625	OSI
163.5125	Disaster Preparedness, frequency paired with 165.1625
163.5875	Command Net paired with 169.600
164.500	Contingency net
165.0125	Law Enforcement
165.1375	Maintenance
165.1625	Disaster Preparedness paired with 163.5125
165.1875	Transportation Net
166.250	Air Terminal Loading Net
169.600	Command Net paired with 163.5875
173.4375	Maintenance
173.5625	Power Substation Control Link
173.7875	Unidentified Net
225.925	Test Depot Maintenance Control — Eagle/Rogue Control/ Raymond 19
227.975	Unidentified air-to-ground
233.400	ACE Supervisor of Flying
240.150	ALC Command Post — Gaslight
252.100	AFRES Command Post — Gun Runner
255.900	Training Net
258.300	F-15 Flight Test
258.500	Unidentified usage
273.825	ATIS
275.200	F-15 Flight Test
275.800	Ground Control
279.600	Macon Approach/Departure Control
280.100	Unidentified usage
280.150	Unidentified usage
287.100	Training Net
287.400	116BW B-1B air-to-air — Peach c/s

293.525	116BW Command Post — Peach Ops
297.600	116BW B-1B air-to-air — Peach c/s
311.000	ACC Command Post — Raymond 19/Black Knight/Apache
314.300	116BW B-1B air-to-air — Peach c/s
320.100	Tower
321.000	ACC Command Post/93 Supervisor of Flight — Raymond 19/ Apache
323.900	Aircraft Repair Depot — Flight Test
324.300	Macon Approach/Departure Control
338.900	Unidentified usage
344.600	Metro
359.100	116BW B-1B air-to-air — Peach c/s
359.200	Aircraft Maintenance
359.300	AFLC ATC
360.750	Approach/Departure Control — Atlanta ARTCC
361.600	KC-135 Training Net
372.200	Dispatcher
388.200	Macon Approach/Departure Control
389.000	Unidentified usage
391.100	Unidentified usage
393.100	ATC Training air-to-ground
399.825	ATC Training air-to-ground
406.350	Trunk System Frequency
406.750	Trunk System Frequency
407.150	Trunk System Frequency
407.175	Unidentified Net
407.225	Training net
407.300	Training net
407.325	Training net
407.375	Training net
407.400	Unidentified Net
407.450	Paging System
407.475	Unidentified Net — data
407.500	Transportation Net
407.525	Disaster Preparedness — repeater output (input 413.150)
407.550	Unidentified Net
407.575	Training Net
407.950	Trunk System Frequency
408.200	Trunk System Frequency
408.750	Trunk System Frequency
409.150	Trunk System Frequency
409.500	Trunk System Frequency
409.550	Trunk System Frequency
409.850	Fire/Crash Net — repeater output (input 413.075)
409.950	Trunk System Frequency
410.025	Maintenance Net
412.975	Unidentified Net — data
413.000	Civil Engineers
413.025	Aerial Port
413.100	Training Net
413.125	Unidentified Net — data
413.175	Supply/Warehouse Support
413.200	Civil Engineers — Prime Beef
413.275	Unidentified Net — data
413.300	Civil Engineers — Prime Beef
413.400	Training Net
413.425	Unidentified Net — data
413.450	Aircrew Alerting
413.825	Medical Net — repeater output (input 408.575)

Home to the Stars

Robins is the Air Force home of the 93rd Air Control Wing and the E-8 JStars aircraft. Here is my latest list of JStars discrete frequencies and call signs.

HF Frequencies: 9019.0 11181.0 11214.0 MHz

VHF/UHF Frequencies: 141.850 225.150 225.575 225.725 225.925
 226.025 227.725 227.925 228.225 228.750 231.750 235.050 235.175
 236.150 239.950 250.900 252.925 257.250 262.450 264.600 267.850
 271.100 271.950 276.050 276.075 279.750 284.150 289.050 293.550
 298.650 303.100 303.275 308.750 308.850 313.650 314.450 315.275
 337.700 345.000 351.025 376.125 380.850 382.600 388.225

JStars 1	93ACW/93TRS	Robins AFB, GA, #86 0416
JStars 3	4411 JTF	Melbourne (Grumman), FL, #90 0175
JStars 3	4411 JTF	Melbourne (Grumman), FL, Test bed aircraft front end crew
Wizzard	4411 JTF	Melbourne (Grumman), FL, Test bed aircraft rear end crew
Razor 93	93ACW	Robins AFB, GA, #96 0042
JStars #	93ACW	Robins AFB, GA, Front end crew
Nightstar	93ACW/12ACCS	Robins AFB, GA, 12 ACCS Mission Crew
Nightstar	93ACW/12ACCS	Robins AFB, GA, 12 ACCS Mission Crew
Alpha	93ACW/12ACCS	Robins AFB, GA, 12 ACCS Mission Crew
Nightstar	93ACW/12ACCS	Robins AFB, GA, 12 ACCS Mission Crew
Bravo	93ACW/12ACCS	Robins AFB, GA, 12 ACCS Mission Crew
Nightstar	93ACW/12ACCS	Robins AFB, GA, 12 ACCS Mission Crew
Maul	93ACW/12ACCS	Nellis AFB, NV
	JEFX 99	Nellis AFB
Razor 01	93ACW	Robins AFB, GA, 93 ACW Commander
Razor 02	93ACW	Robins AFB, GA, 93 ACW Vice Commander
Razor 03	93ACW	Robins AFB, GA, 93 OG Commander
Razor 2X	93ACW/12ACCS	Robins AFB, GA, 12 ACCS flight
Razor 3X	93ACW	Robins AFB, GA, 93 training squadron flight
Star ##	93ACW	Robins AFB, GA, US Army Common Ground Stations (formerly GSMs)
Stargate	93ACW/93TRS	Robins AFB, GA, 93 TS Mission Crew
<Word>		
Gypsy	Unknown	
Jake ##	Operation Allied Force	E-8 callsign
Ranger ##	93ACW	Robins AFB, GA,
Razor ##	93ACW	Robins AFB, GA,
Trin ##	93ACW	Robins AFB, GA, Enroute the Gulf Operation Desert Thunder 98

Many thanks to Mac for providing us an update on a previously unreported military trunk system.

Military Trunk System Update

I am hoping to run a complete update starting this fall in this column on the various military trunk systems throughout the country. If you are currently monitoring a military trunk system in your area, we would like to hear from you and compare notes. We have quite a few systems we know are on the air, but have not heard anything about at this point. And we are always looking for updates on the systems we have notes on.

You can write us via email at larry@monitoringtimes.com or snail mail to: 7540 Highway 64 West, Brasstown, NC 28902.

I mentioned the new *Grove Military Directory* in the first segment of this month's column. If you want to listen to military aircraft, this is the only directory of its kind in the marketplace. The *Grove Military Frequency Directory*, 1st edition on CD-ROM, is available exclusively from Grove Enterprises for \$39.95 plus \$3.50 S&H. You can order it by calling 800-438-8155 or directly via e-commerce at <http://www.grove-ent.com>

So, until next month, 73 and good hunting.

Table 1: Official Military Callsigns

This month's military callsign list is an extract from an official list of aircraft callsigns provided by the International Civil Aeronautics Organization (ICAO). These callsigns are the ones that are used by aircraft from the indicated agencies when in contact with civilian air traffic control facilities. The three letter ICAO code is used as an identifier on flight plans.

Voice Callsign	Company	Country	3-Ltr
ACEFORCE	Allied Command Europe (Mobile Force)	Belgium	ALF
AIR CADET	RAF Air Cadet Schools	United Kingdom	ACW
AIRFORCE SWITZERLAND	Bundesamt Fur Betriebe Der Luftwaffe (BABLW)	Switzerland	SUI
ANGKASA	Royal Malaysian Air Force	Malaysia	RMF
ANGLESEY	Valley FTU	United Kingdom	YVT
ARMYAIR	Army Air Corps	United Kingdom	AAC
ASCOT	RAF-HQSTC (Air Transport)	United Kingdom	RRR
AUSSIE	Royal Australian Air Force	Australia	ASY
BELGIAN AIRFORCE	Belgian Air Force	Belgium	BAF
BELGIAN ARMY	Force Terrestre Belge	Belgium	AYB
BELGIAN NAVY	Force Navale Belge	Belgium	NYB
BOX KAR	Civil Air Patrol, South Carolina Wing	United States	BKR
BRAZILIAN AIR FORCE	Brazilian Air Force	Brazil	BRS
BRAZILIAN ARMY	Brazilian Army Aviation	Brazil	EXB
BRAZILIAN NAVY	Brazilian Navy Aviation	Brazil	MBR
BROADWAY	Fleet Requirements Air Direction Unit	United Kingdom	BWY
CANADIAN COAST GUARD	Canadian Coast Guard	Canada	CTG
CANFORCE	Canadian Armed Forces	Canada	CFC
CAP-FLIGHT	U S Air Force Auxiliary, Civil Air Patrol (Maxwell AFB, AL)	United States	CPF
CHURCH FENTON	Church Fenton FTU	United Kingdom	CFN
COASTGUARD	HM Coastguard	United Kingdom	*
COLOMBIAN AIR FORCE	Fuerza Aerea Colombiana	Columbia	*
COLOURS	Flying Colours	United Kingdom	FCL
COLT	Coltishall FTU	United Kingdom	COH
COTAM	Commandement du Transport Aerien Militaire Francais	France	CTM
CRANWELL	Cranwell FTU	United Kingdom	CWL
CRATER	Cottesmore FTU	United Kingdom	COT
CZECH AIR FORCE	Czech Air Force	Czech Republic	CEF
DANISH AIR FORCE	Danish Air Force	Denmark	DAF
DANISH ARMY	Danish Army	Denmark	DAR
DANISH NAVY	Danish Navy	Denmark	DNY
DEFENCE	Papua New Guinea Defense Force	New Guinea	*
DIPLOMATIC CLEARANCE	Federal Armed Forces, Germany	Germany	DCN
FINNFORCE	Finnish Air Force, Headquarters	Finland	FNF
FINNGUARD	Frontier Guard, Finland	Finland	FNG
GERMAN AIR FORCE	German Air Force	Germany	GAF
GERMAN ARMY	German Army	Germany	GAM
GERMAN NAVY	German Navy	Germany	GNY
GOLDEN KNIGHTS	U S Army Parachute Team	United States	GKA
HELLENIC AIR FORCE	Hellenic Air Force	Greece	HAF
HELLENIC NAVY	Greek Navy (Hellenic Navy)	Greece	HNA
ICELAND COAST	Icelandic Coast Guard	Iceland	ICG
INDIAN AIRFORCE	Indian Air Force	India	IFC
IRISH	Irish Air Corps	Ireland	IRL
J-PAT	Dept. of the Army, Operational Support Airlift Command (Ft. Belvoir, VA)	United States	JPA
JORDAN AIR FORCE	Royal Jordanian Air Force	Jordan	RJZ
KINLOSS	Kinloss FTU	United Kingdom	KIN
KITTY	UK Royal/Positioning Flights	United Kingdom	RRF
KITTYHAWK	UK Royal/VIP Flights	United Kingdom	KRF
KIWI	Royal New Zealand Air Force	New Zealand	KIW
KIWI RESCUE	New Zealand Air Defence Force	New Zealand	KRC
LATVIAN AIRFORCE	Latvian Air Force	Latvia	LAF
LINTON ON OUSE	Linton-on-Ouse FTU	United Kingdom	LOP
LOSSIE	Lossiemouth FTU	United Kingdom	LOS
MAJAN	Royal Air Force of Oman (Air Transport)	Oman	MJN
MARHAM	Marham FTU	United Kingdom	MRH
NAVY	Royal Navy	United Kingdom	NVY
NETHERLANDS AIR FORCE	Royal Netherlands Air Force	Netherlands	NAF
NETHERLANDS COASTGUARD	Nederlandse Kustwacht	Netherlands	NAF
NETHERLANDS NAVY	Royal Netherlands Navy	Netherlands	NCG
NIGERIAN AIR FORCE	Nigerian Air Force	Nigeria	NRN
NIGHTHAWK	Federal Aviation Administration (ATO-330)	United States	NGR
NORWEGIAN	Royal Norwegian Air Force	Norway	NHK
OPEN SKIES	Open Skies Consultative Commission (OSCC)	United States	NOW
PARA	Army Parachute Centre	United Kingdom	OSY
PAT	Department of the Army, Priority Air Transport (Davison Aviation Command) (Fort Belvoir, VA)	United States	*
POLISH AIR FORCE	Polish Air Force	United States	PAT
PORTUGUESE AIR FORCE	Portuguese Air Force	Poland	PLF
PORTUGUESE NAVY	Portuguese Navy	Portugal	APF
RAFAIR	Royal Air Force	Portugal	PON
RAINBOW	UK Royal/VIP Helicopter Flights	United Kingdom	RFR
REACH	Air Mobility Command (AMC)	United Kingdom	TQF
RED ARROWS	Red Arrows Display Squadron	United States	RCH
RED DEVILS	Red Devils Parachute Display Team	United Kingdom	SAK
ROMAF	Romanian Air Force	United Kingdom	DEV
RUSSIAN AIR FORCE	Russian Federation Air Force	Romania	ROF
SHAWBURY	Shawbury FTU	Russian Federation	RFF
SINGA	Republic of Singapore Air Force	United Kingdom	SYS
SLOVAK AIR FORCE	Slovak Air Force	Singapore	SAF
SLOVENIAN	Slovenian Armed Forces	Slovakia	SQF
SOUTH AFRICAN	South African Air Force	Slovenia	SVI
STRIKER	Wittering FTU	South Africa	LMG
SWEDFORCE	Swedish Armed Forces	United Kingdom	WIT
TOPCLIFFE	Topcliffe FTU	Sweden	SVF
TYPHOON	Coningsby FTU	United Kingdom	TOF
UNIFORCE	United Arab Emirates Air Force	United Kingdom	CBY
UNITED NATIONS	United Nations Organization	United Arab Emirates	UAF
VULCAN	Waddington FTU	UNO	
		United Kingdom	WAD

Bits and Pieces

have a little bit of everything this month...

◆ Station Changes

There are a fair number of permits for construction of new AM stations. It's relatively rare that one is built and actually comes on the air, but it did happen here in Nashville in late February. **WKDA-1200** is now on the air with a Spanish-language music format, and operating with 10,000 watts nondirectional, daytime only. It's already been DXed 200 miles away. An application is on file to add a directional antenna and 195-watt transmitter for nighttime operation.

WKDA sold their former 1430 frequency to Nashville Public Radio. The 1430 station is now known as **WPLN**. It carries National Public Radio spoken-word programming, including the BBC overnight. This is a growing trend, for public radio stations to obtain formerly-commercial AM stations for spoken-word programming. And quite a few of these stations relay various international broadcasters overnight. If you hear what sounds like a shortwave broadcast station on the AM band late at night, consider the possibility that you're hearing a public radio outlet.

The FCC has granted six new AM stations since the first of the year. **WWWN-1590** will be

located at Oakville, Connecticut, near Waterbury; it takes over the frequency once used by defunct station WBRY. The address of WWWN's corporate owners is in Puerto Rico, which causes me to suspect this station will broadcast in Spanish. **KBCV-1570** is at Hollister, Missouri, near Branson. It belongs to religious group owner Bott Broadcasting. **KBET-1440** is located in Pocatello, Idaho. And new stations with no callsigns yet assigned will operate on 890 in Meridian, Idaho; 720 in DeWitt, New York; and 1470 in Tremonton, Utah. The latter station also takes over a frequency abandoned by another station.

In Jacksonville, Florida, a long-lived business relationship on the TV dial has ended. **WJXT-TV** channel 4 signed on in 1949 as a CBS affiliate. That affiliation has ended; WJXT was unable to reach agreement with CBS on renewal. UPN affiliate **WTEV** channel 47 will take over the CBS affiliation. You may recall a similar disagreement in San Francisco resulting in NBC affiliate KRON channel 4 ending up independent, and NBC buying San Jose station KNTV channel 11. The business conditions that result in these disagreements are fairly common in the television industry. Expect more changes like this. (WJXT is a frequently-seen E-skip target, one which now will be much easier to identify!)

◆ Silent Opportunities

Last month, I mentioned a silent period at powerhouse stations WFAN-660 and WCBX-880 New York. Many DXers received some interesting loggings during this silent period, many of them of Canadian stations. In mid-April, the Canadians returned the favor. CINW-940 Montreal scheduled antenna maintenance, leading to some time off the air. At deadline it hasn't been officially announced, but CINW-690 shares CINW's antenna, and one might expect 690 to be off the air, too. Last time Montreal-690 was off the air, CBU-690 Vancouver was heard in the East.

After several such incidents of scheduled silent periods for major stations, the National Radio Club has decided to launch a new column in its *DX News* newsletter. "Silent Nights" will keep DXers informed of upcoming DX opportunities on major clear-channel frequencies. This is yet another reason to join a MW club. (Visit <http://www.nrcdxas.org> for more information, or send a stamp to 2840 S.E. Illinois Ave., Topeka KS 66605-1427 for a sample newsletter).

◆ Cross-Border Targets

Domestic AM/FM/TV stations here in

North America usually only target an audience in the same country in which the transmitter is located. A handful of stations do, however, engage in cross-border broadcasting. This is most prevalent in the San Diego/Tijuana area, where five Mexican radio stations and two TV stations broadcast in English for a California audience.

It is a little-known fact that U.S. networks wishing to send programming into Mexico for broadcast back into the USA require permission from the FCC. Such permission has been granted to ABC, to transmit programming to XEMMM-800 Tijuana. Speculation is that this Spanish-language station will switch to ESPN Radio in English. (However, this is only speculation.)

◆ Mailbag

One of the strongest European AM signals in North America belongs to Norway's NRK on 1314 kHz. DXer T.S. Bauge traveled to the transmitter site of this station, and posted some photos on the web. Check out <http://home.online.no/~tjbauge/radio/pictures/kvitsoy/>.

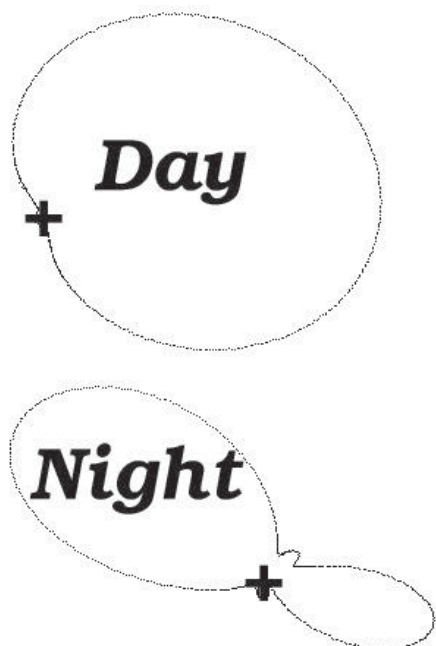
Another website is recommended by Roland Stiner NK2U: <http://100kwatts.tmi.net> (also known as <http://www.100000watts.com>) is an excellent reference to U.S. AM, FM, and TV stations. Technical information, programming and network information, transmitter site maps, and news are all available.

Finally, on the Internet front, some sites with plans for homemade box loop antennas for AM DXing. Try <http://www.geocities.com/rbrucecarter/amloop4.htm> and <http://www.angelfire.com/mb/amandx/loop.html>.

Don Hallenbeck wrote from central Maine with some DX loggings. Don uses a Sangean ATS-818CS and Select-a-Tenna from a rather noisy apartment, but still hears WCBX-880 and WQEW-1560 from New York. On occasion, he can get WBZ-1030 Boston during the day, a distance of 200 miles. Boston's Radio Disney station (WMKI-1260) doesn't make the trip, due to interference from a country station. (CKHJ, Fredericton, New Brunswick)

My automatic DX recordings continue to yield some interesting signals. Recent overnight automatic catches include KKWY-1630 Wyoming, KSOO-1140 South Dakota, KGHF-1350 Colorado, WIZM-1410 Wisconsin, and KIVY-1290 Texas. Recordings of many of these stations are on my website on <http://audio.w9wi.com>.

Have you made any interesting DX recordings? Write me at Box 98, Brasstown NC 28902-0098, or by email to w9wi@w9wi.com. Good DX!



New station KBCV-1570 in Missouri will use these directional-antenna patterns.

ACE Celebrates 20th Anniversary

Publisher Harry Helms of *The Association of Clandestine Radio Enthusiasts* points out that the May 2002 issue of *The ACE* was the 20th anniversary issue of this club's monthly bulletin. When it was founded in 1982 by Darren Leno, ACE quickly became not only the dominant North American shortwave club devoted exclusively to DXing unlicensed broadcasts, but also the only such club.

It is ironic that a few years later, ACE created some controversy when its application for admission to the Association of North American Radio Clubs generated some opposition on the grounds that ANARC should not promote illegal activity. ACE overcame that opposition, and since then it has become one of the most stable examples of an ANARC radio hobby club.

Even now, every *ACE* prints a disclaimer on the back cover of its bulletin each month, "The *ACE* as an organization, does not encourage, support, or condone any illegal activity; we simply seek to understand the nature and reasoning behind such broadcasts." This is much the same philosophy that *Monitoring Times* has always followed in its coverage of pirate, clandestine, "spy" numbers, and other stations that still populate the electromagnetic spectrum.

After all, when CNN and the *Louisville Courier Journal* covered news of the assassination of Pulaski County (KY) Sheriff Sam Catron, they were not promoting the shooting of the sheriff. To the contrary, basic journalism in a country with a free press requires such news coverage.

After several years under the leadership of founder Darren Leno, an all star cast of subsequent publishers including Kirk Baxter, John T. Arthur, and Harry Helms have kept ACE in business since then. The first widespread use of computers in the DX hobby was pioneered by Kirk Baxter and ACE with the old ACE computer BBS. In the pre-internet days this was an important achievement. This BBS later became the ANARC BBS.

If you are interested in a supplement to the unlicensed broadcasting news that is in *Monitoring Times*, then *The ACE* remains a worthy choice. As we note every month in this column, a small handful of pirate stations still offer souvenir QSLs only in response to loggings of their station in ACE and/or the internet-based *Free Radio Weekly*

newsletter. Thus, serious pirate chasers continue to make it a habit of publishing their catches in both *ACE* and *FRW*.



Sample copies of *The ACE* are still available for \$2.00 via the Belfast maildrop (address below).

◆ Palestine Station

Many *MT* readers have been searching for programming on shortwave from Palestine, given the continuing Middle East crisis. Via *DXplorer*, Tony Rogers noted reception in the UK **Voice of Palestinian Islamic Revolution** on 11840 kHz for several minutes on either side of 2000 UTC. This one uses Iranian transmitters and is using other parallel frequencies of 6200 9705 9860 and 11740 KHz, so even North American DXers might have a shot at this one.

◆ No Al-Qaida Station

At *MT* we occasionally get an inquiry on how to hear broadcasts from the Al-Qaida terrorist organization. After all, during other wars fought by the United States for the last eighty years or so, the opposition inevitably communicated with North America by either a government sponsored radio station or more commonly via a clandestine broadcaster. This time around, there is no such station. Al-Qaida apparently feels no need to communicate with its enemy, or at least the general population of its enemy through broadcasting. This curious fact has received little attention in the press.

◆ No Radio Sawa on Shortwave

The United States has used a variety of broadcasting strategies in its conflict with Al-Qaida, including the clandestine **Information Radio** broadcasts still sometimes audible on 8700 kHz in upper sideband, now from a classified ground-based transmitter site instead of its former aircraft-based transmitter.

The latest US broadcasting effort toward

the Middle East, **Radio Sawa**, has received relatively little attention because its broadcasting strategy has concentrated on local "placement" using medium wave and FM stations in the Middle East, rebroadcasting its satellite feed. Programming is a mix of Arabic and Western music, as well as Arabic language news and commentary. The format, designed through marketing research to appeal to a wide Middle Eastern audience, is overtly targeted toward a young Middle Eastern audience for the purpose of exporting American values and ideas.

◆ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses: PO Box 1, Belfast, NY 14711; PO Box 28413, Providence, RI 02908; PO Box 69, Elkhorn, NE 68022; PO Box 11522, Huntsville, AL 15814; PO Box 293, Merlin, Ontario N0P 1W0, Canada; and PO Box 663, 7900ar Hoogeveen, the Netherlands. Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletins for sending pirate loggings with a hope that pirates might QSL them remain *The ACE* (discussed above) and the e-mailed *Free Radio Weekly* newsletter, still free to contributors via yukon@tm.net.

◆ Thanks

Your loggings (which we postponed until next month) and news are always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: John T. Arthur, Belfast, NY; Jerry Berg, Lexington, MA; Kirk Baxter, North Canton, OH; Ralph Brandi, Tinton Falls, NJ; Ross Comeau, Andover, MA; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; Mike Gaukin, North Olmsted, OH; William Hassig, Mount Prospect, IL; Harry Helms, Ridgecrest, CA; Harald Kuhl, Germany; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Bill McClintock, Avon Lake, OH; Lee Reynolds, Leppster, NH; Tony Rogers, UK; Walt Salmani, Victoria, BC, Canada; Martin Schoech, Merseburg, Germany; Lee Silvi, Mentor, OH; Bud Stacey, Setsuma, AL; and Niel Wolfish, Toronto, Ontario.

New England DXing II

The April column on New England Beacons drew more interest than I had expected. Several readers wrote to share their experiences in logging these stations and some even sent QSL cards to document their intercepts. Although these beacons are not the easiest targets to pursue, many readers are having considerable success through persistence and ingenuity.

Allen Renner (PA) has logged many, if not most, of the beacons listed in the April column. He uses a Realistic DX-440 receiver and a homebrew loop antenna built from plans in the September '92 *Below 500 kHz* column. Allen offers a tip for those hunting beacons in the New England region. He has found that the best times to catch them are during the cooler months, and when the weather maps show a slow moving low-pressure center in New England or the Canadian Maritimes. This, combined with an approaching high-pressure front from the Ohio Valley, seems to have a favorable effect on beacon signals arriving at his location in Pennsylvania. Allen admits that he's not a weather expert, but he has found that checking the weather maps before a listening session can have a big payoff. Several of his loggings are included in Table 1.

QSL card from TAN/227 kHz in Taunton, MA. Courtesy of Allen Renner (PA)

We are also pleased to hear from Perry Crabill (VA) who forwarded his list of New England catches made between January 1990 and October 1998 (see selections in Table 1). For most of his loggings, Perry used a Drake R8 receiver and a variety of antennas including a 100-foot random wire, homemade two-foot square loop, Palomar ferrite loop, and an RSM 105-C three-foot longwave loop. Perry was a frequent contributor to the column back in the '90s, but excessive line noise put an end to his longwave listening activities. Good to hear from you again, Perry, and I hope you'll check in from time to time.

Finally, we are glad to hear from Ralph Craig

(OH) who, for 31 years, worked with beacon transmitters as an FAA employee. Recently, Ralph took a road trip back "home" to New Hampshire and logged several beacons in the region (see selections in Table 1). He ran his station mobile, operating everything off the car battery. His gear included a Yaesu FR-101 receiver, homebrew LF converter, and an active whip antenna with a magnetic mount base.

Table 1. Selected Beacon Loggings

FREQ.	ID	LOCATION	BY
194	TUK	Nantucket, ME	P.C. (VA)
209	MT	Chibougamau, PQ	A.R. (PA)
216	BID	Block Island, RI	A.R. (PA)
220	IHM	Mansfield, MA	P.C. (VA)
221	RQM	Rangely, ME	P.C. (VA)
224	VWD	West Dover, VT	A.R. (PA)
227	TAN	Taunton, MA	R.C. (NH)*
238	MMK	Meriden, CT	A.R. (PA)
240	LE	Lewiston, ME	P.C. (VA)
242	EFK	Newport, VT	P.C. (VA)
257	TBY	Waterbury, CT	P.C. (VA)
260	ESG	Rollinsford, NH	R.C. (NH)*
265	SXD	Springfield, VT	P.C. (VA)
268	VXN	Mt. Mansfield, VT	P.C. (VA)
269	TOF	Beverly, MA	R.C. (NH)*
272	OLD	Oldham, ME	P.C. (VA)
276	IAH	Hanover, MA	P.C. (VA)
278	BST	Belfast, ME	P.C. (VA)
279	CQX	Chatham, MA	P.C. (VA)
326	BHF	Freeport, BAH	A.R. (PA)
328	LC	Laconia, NH	A.R. (PA)
330	BH	Bar Harbor, ME	P.C. (VA)
332	BE	Bedford/Stowe	P.C. (VA)
334	RM	Rockland, ME	R.C. (NH)*
338	DRY	Derry, MA	P.C. (VA)
342	HY	Hyannis, MA	R.C. (NH)*
346	IJ	Boston, MA	A.R. (PA)
349	SF	Sanford, ME	R.C. (NH)*
352	DKO	Ft. Devens, MA	A.R. (PA)
356	SUH	Owls Head, ME	R.C. (NH)*
356	AR	Providence, RI	R.C. (NH)*
359	AS	Cherry/Nassau, MA	P.C. (VA)
362	OX	Oxford, CT	P.C. (VA)
368	IMR	Marshfield, MA	P.C. (VA)
375	JRV	Morrisville, VT	A.R. (PA)
375	BO	Milton, MA	P.C. (VA)
380	UCY	Cayoajabo, Cuba	A.R. (PA)
382	APT	Jasper, TN	A.R. (PA)
382	LQ	Lynn, MA	P.C. (VA)
386	GMA	Dalton, NH	A.R. (PA)
388	BD	Windsor Locks, CT	A.R. (PA)
389	PVC	Provincetown, MA	P.C. (VA)
391	DDP	San Juan, PR	A.R. (PA)

394	PW	Portland, ME	R.C. (NH)*
395	GBR	Great Barrington, MA	P.C. (VA)
397	OW	Norwood, MA	P.C. (VA)
401	Y8	Drummondville, PQ	A.R. (PA)
402	LW	Lawrence, MA	P.C. (VA)
406	FLR	Fall River, MA	A.R. (PA)
407	ISS	Wicasset, ME	A.R. (PA)
417	EK	Gozz/Worcester, MA	P.C. (VA)
450	PPA	Puerto Plata, DOM	A.R. (PA)
526	ZLS	Stella Maris, BAH	A.R. (PA)

* Mobile logging from New Hampshire

◆ LF Ham Band

Well, after nearly four years of watching and waiting, it finally looks like it will happen. In early May, the FCC gave its support for a 136 kHz ham band allocation as requested by the ARRL in October of 1998. The actual frequency range would be 135.7 to 137.8 kHz. According to the *ARRL Letter*, hams would be secondary users in this band to the Fixed and Maritime Mobile services. A Notice of Proposed Rulemaking (NPRM) should be released by the time you read this, with an opportunity for public comment.

Perhaps the bigger story here is the fact that the Commission did *not* grant the original ARRL request for a ham allocation in the present 160 to 190 kHz "Lowfer" band. Many Lowfer operators (several of whom are hams) were concerned about the incursion of high-powered "big gun" stations on the band, and the effects it might have on weak signal experimentation.

The *Below 500 kHz* column served as an early forum for those expressing concerns about a 160-190 kHz ham allocation, and we encouraged readers to submit their comments to the FCC for formal consideration. Whatever may happen in the future, it is refreshing to see that the matter was not simply "rubber-stamped" into approval by the FCC.

See you next month.



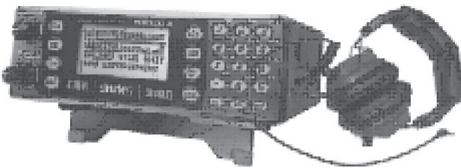
Future DXer Alex Smith, checks out the station of his Dad, Bryan (KB3FGL)

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Size: 10 1/2" Wide x 7 1/2" Deep x 3 3/8" High

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Trunk Lockout • Trunk Delay • Cloning Capability

10 Priority Channels • Programmed Service Search

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Our Bearcat TrunkTracker BC245XLT, is the world's first scanner designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS and EDACS® analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. Our scanner offers many new benefits such as Multi-Track - Track more than one trunking system at a time and scan conventional and trunked systems at the same time. 300 Channels - Program one frequency into each channel. 12 Bands, 10 Banks - Includes 12 bands, with aircraft and 800 MHz. 10 banks with 30 channels each are useful for storing similar frequencies to maintain faster scanning cycles or for storing all the frequencies of a trunked system. Smart Scanner - Automatically program your BC245XLT with all the frequencies and trunking talk groups for your local area by accessing the Bearcat national database with your PC. If you do not have a PC simply use an external modem. Turbo Search - Increases the search speed to 300 steps per second when monitoring frequency bands with 5 KHz. steps. 10 Priority Channels - You can assign one priority channel in each bank. Assigning a priority channel allows you to keep track of activity on your most important channels while monitoring other channels for transmissions. Preprogrammed Service (SVC) Search - Allows you to toggle through preprogrammed police, fire/emergency, railroad, aircraft, marine, and weather frequencies. Unique Data Skip - Allows your scanner to skip unwanted data transmissions and reduces unwanted birdies. Memory Backup - If the battery completely discharges or if power is disconnected, the frequencies programmed in your scanner are retained in memory. Manual Channel Access - Go directly to any channel. LCD Back Light - An LCD light remains on for 15 seconds when the back light key is pressed. Autolight - Automatically turns the backlight on when your scanner stops on a transmission. Battery Save - In manual mode, the BC245XLT automatically reduces its power requirements to extend the battery's charge. Attenuator - Reduces the signal strength to help prevent signal overload. The BC245XLT also works as a conventional scanner. Now it's easy to continuously monitor many radio conversations even though the message is switching frequencies. The BC245XLT comes with AC adapter, one rechargeable long life ni-cad battery pack, belt clip, flexible rubber antenna, earphone, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, ESAS or LTR systems.

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Bearcat 245XLT 300 ch. TrunkTracker II handheld scanner.....	\$189.95
Bearcat 248CLT 50 ch. base AM/FM/weather alert scanner.....	\$89.95
Bearcat Sportcat 200 alpha handheld sports scanner.....	\$169.95
Bearcat Sportcat 180B handheld sports scanner.....	\$149.95
Bearcat 80XLT 50 channel handheld scanner.....	\$99.95
Bearcat 60XLT 30 channel handheld scanner.....	\$74.95
Bearcat BCT7 information mobile scanner.....	\$139.95
AOR AR8200 Mark II Wide Band handheld scanner.....	\$539.95
AOR AR16BQ Wide Band scanner with quick charger.....	\$209.95
ICOM PCR1000 computer communications receiver.....	\$379.95
ICOM R10 handheld wideband communications receiver.....	\$279.95
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As most folks come to know soon after getting their Amateur Radio License, the folks that populate the ham frequencies are a varied bunch. During any operating session you can talk to people from all walks of life. So it shouldn't be too surprising when I tell you that quite a number of newsworthy, noteworthy, famous and even infamous folks have been heard in the wonderful world of amateur radio. It is possible to talk to kings, astronauts, authors, entertainers, leaders of industry and many other interesting and amazing people who sit down to play radio just like the rest of us.

It took a while but Old Uncle Skip did some digging and came up with some very interesting notable people who are (or have been) hams. Sadly, some are now "Silent Key," but don't be surprised if you hear some of the other callsigns I tracked down as you tune across the ham bands. Amateur radio is a great hobby that provides fun and relaxation for some very interesting people.

THE PATRON SAINT OF AMATEUR RADIO

Franciscan Priest Maximilian Maria Kolbe was licensed as SP3RN in his native Poland. During the Second World War his friary served as a refuge for over 4500 Poles and Jews. He was captured by the Nazis in 1941 and executed. He was canonized in 1982. While the Catholic Church officially recognizes Kolbe as the patron saint of political prisoners, many hams around the world also view him as the patron saint of amateur radio.

RAGGEDY ANN AND ANDY HAMS?

Most folks remember the little red headed girl and boy rag dolls with the candy kiss hearts from their childhood. The Raggedy Ann and Andy stories have been circulated around the world in dozens of languages. They remain as popular today as they did when Johnny Gruelle first authored them so long ago. Many of the Raggedy Ann and Andy books were illustrated by Johnny's son, Worth Gruelle, who was also known to the world by his amateur radio callsign W4ZG.

SCI-FI AMATEUR

I've often wondered why more science fiction authors were not hams. I know many cur-

rent authors are serious computer "geeks." But maybe the one callsign I did track down makes up for all the others. John Campell, the late editor of *Astounding* and *Analog* science fiction magazines, was an active amateur radio operator under the callsign W2ZGU. Campell was the mentor to many of the greatest names in science fiction such as Robert A. Heinlein and Isaac Asimov. No doubt his sound technical grounding (that included radio) was what made it possible for him to be the father of what we know today as "hard" science fiction.

NOBEL HAM

Probably the greatest achievement in the world of science is to be awarded the prestigious Nobel Prize. Dr. Joseph H. Taylor is the James McDonnell Distinguished University Professor of Physics at Princeton University. In 1993, Taylor, along with Dr. Russell A. Hulse, won the Nobel Prize for Physics for their discovery of a binary pulsar. The award was for physics instead of astrophysics because of the basic information into gravity that their discovery provided. Is it any wonder that a man who can track distant intergalactic radio signals might be an amateur radio operator? Dr. Taylor's callsign is K1JT.

AMATEUR ADVENTURE

Many hams travel the world right from their operating desks while racking up countries on the DXCC list. But a few hams have also become world famous "actual" globe trotters.

Thor Heyerdahl thrilled the world with his *Kon Tiki* raft expedition in 1947 and his later *Ra II* expedition in 1970. Most men my age read of his adventures and dreamed of traveling to distant places in search of adventure. Heyerdahl was also a ham. His call was LI2B. Thor Heyerdahl died recently on April 17, 2002.

And while we are on the subject of globe trotting, how about flying around the world non-stop? In 1986 Dick Rutan and Jeana Yeager flew their *Voyager* aircraft around the world on one tank of gas. Rutan is also known for some of the most innovative aircraft designs ever flown. Dick's callsign is KB6LQS and Jeana's callsign is KB6LQR.

AMATEUR ASTRONAUTS

Hams have been involved in the aerospace

movement since the early 1960s with the OSCAR satellite program. However, the entire amateur radio community looked forward to the day when a person traveling in space would communicate with hams back on earth. This was realized in November 1983 when Owen Garriot W5LFL operated during the STS-9/Spacelab-1 mission.

Since his operation, dozens of men and women have been licensed and have operated amateur radio stations from space. Various NASA shuttles and the Russian *Mir* space station have hosted ham



Cosmonaut Yuri Gagarin was UA1LO

radio operations. The International Space Station (ISS) is expected to have regular ham communications throughout its mission. The Space Amateur Radio Experiment (SAREX) has allowed over 200 schools the opportunity to talk with astronauts in space to date and many more missions

are planned!

But no commentary on amateurs in space would be complete without mentioning that the first human being in space, Yuri Gagarin, who flew *Vostok 1* on April 12, 1961, was an avid ham radio operator with the callsign of UA1LO. While he never had the opportunity to participate in ham radio from space, I am told he was often heard on 20 meter CW before his death in an aircraft accident in 1968.

MILITARY HAMS

Amateur radio and the military have always had a close relationship. The Military Amateur Radio System (MARS) has handled message traffic between military personnel and their loved ones for many years. It's not too surprising that there have been a few notable hams that have risen to the higher ranks of the armed forces.

Brigadier General Paul W. Tibbets Jr. piloted the *Enola Gay* on the first atomic bomb mission, dropping the bomb on Hiroshima and hastening the end of World War II in the Pacific. His callsign is K4ZVZ.

General Eugene E. Habiger served as the commander in chief, United States Strategic Command. His callsign is K6EWP.

Lieutenant General Francis Griswold served as vice commander in chief of Strategic Air Com-

mand and as Commandant of the National War College. His callsign was K0DWC.

Perhaps the most famous military leader and ham radio operator was General Curtis Lemay W6EZV who, among many exploits, served as Chief of Staff of the United States Air Force. It was General Lemay's tactical procedures that made B-17 and B-29 bombers so successful during World War II. There is a famous, although possibly apocryphal story told of General Lemay having a QSO one afternoon. The ham on the other end of the conversation asked Lemay what he did for a living. The General replied, in a non-committal way, that he "was in the Air Force." The first ham apparently was a rather low ranking airman who had no idea that this "Curt" was talking to was a General and he apparently said quite a few things about the Air Force that he probably would have skipped over had he known about the stars on the shoulders of W6EZV.

ROYAL AMATEURS

Most hams have heard that the late King Hussein of Jordan was a very active ham as JY1. He was a regular check in on the "Arabian Knights" net. His wife Queen Noor is also licensed as JY1NH. But there have been other royal hams through the years.

The late King Hassan II of Morocco was licensed as CN8MH. King Juan Carlos of Spain held the callsign EA0JC. The King of Thailand Bhumiphol Adulyadej holds the call HS1A. As they say... "It's good to be the king!"

PRESIDENTS AND PRIME MINISTERS

It's not just royalty that enjoy the hobby of amateur radio. Francesco Cossiga, the former President of Italy holds the callsign I0FCG. Keizo Obuchi, the late Prime Minister of Japan held the callsign J11KIT. Carlos Saul Menem, the former President of Argentina holds the callsign LU1SM. Rajiv Gandhi, the late Prime Minister of India held the callsign VU2RG. General Anastasio Somoza, the late president of Nicaragua held the callsign YN1AS. Sir Thomas Davis, the former Premier of the Cook Islands, holds the callsign ZK1AN.

AND DON'T FORGET POLITICIANS

New York Governor George Pataki was once licensed as K2ZCZ. David Funderburk, former Representative from North Carolina holds the callsign K4TPJ. Rep Greg Walden, WB7OCE, Republican representative from Oregon, is the only licensed amateur currently serving in Congress.

The most famous American ham politician remains the late Senator from Arizona, Barry Goldwater K7UGA. Throughout his career, Senator Goldwater was a staunch friend of amateur radio.

ACTOR AMATEURS

When not in the spotlight, quite a few ac-

tors are, or have been, hams.

Stewart Granger is N6KGB; the late Andy Devine was known as WB6RER when he wasn't playing somebody's sidekick. "The King" was never licensed as a ham but his ex-wife Pricilla Presley holds the callsign N6YOS. The late Burl Ives was KA6HVA. Comedian Stu Gilliam is licensed as K16M.

Perhaps the most famous and controversial actor amateur is Marlin Brando, who is known to operate from his home in French Polynesia as "Martin Brandeux" FO5GJ.

TV HAMS

There are two famous TV personalities I would personally love to work on the air someday: Walter Cronkite KB2GSD and Hugh Downs KD6WUS.

I should also mention here that the late Arthur Godfrey held the callsign K4LIB.

RADIO HAMS

No list of famous hams would be complete without mentioning the late author, actor, comedian Jean Shepherd K2ORS. "Shep" was beloved by the ham radio community. While he'll be forever remembered for the movie "The Christmas Story," he will be recalled by the many hams who had the pleasure to work him on the air.

Late night talk show host Art Bell is an active ham. His callsign is W6OBB.

COUNTRY FRESH HAMS

Country Western music has its share of ham operators. These include the late Chet Atkins W4CGP who was known on the air by the phonetics "Certified Guitar Picker."

Singer/Songwriter Ronnie Milsap is a very active ham. His callsign is WB4KCG.

Country singer Patty Loveless holds the call KD4WUJ.

ROCKIN' AMATEURS

Rock and Roll can't be outdone by the C&W crowd so here are a few ham rockers for you.

Larry Junstrom, the bass guitarist for the group .38 Special is K4EB.

Stu Cook, the bass guitarist of the group Creedence Clearwater Revival, is N6FUP.

Joe Walsh of The Eagles (and for you older Hippies, The James Gang) is WB6ACU. By the way, Joe is quite a collector of old Collins radio gear. I bring this up just to mention that Art Collins, the late founder of Collins Radio was W0CXX.

And, as they say, the list gets longer every day. I know of quite a few more. Maybe they will make another column someday. Amateur radio remains the great hobby it is because people from all stations in life can join together in the common fun of radio communication. No matter who we are in the "real world," on the ham bands we're all just amateurs having fun.

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Michigan QRP July 4th CW Sprint

July 4 2300 UTC - July 5 0300 UTC

Kentucky QSO Party

July 6 1600 UTC - July 7 0400 UTC

IARU HF World Championship

July 13 1200 UTC - July 14 1200 UTC

QRP ARCI Summer Homebrew Sprint

July 14 2000 UTC - 2400 UTC

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July 27 1200 UTC - July 28 1200 UTC

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A VTVM for Your Test Bench

Over the years, I've looked at a lot of articles on "getting started in electronics" or "getting started in antique radio." Quite frequently such articles will advise acquiring an VTVM (vacuum tube voltmeter) first crack out of the box. I don't agree with this philosophy, which is why I've waited this long in my series of radio restoration articles to introduce the subject. In the first place, an ordinary 20,000 ohms-per-volt analogue volt-ohmmeter (VOM), readily available brand new from Radio Shack at a very reasonable price, will handle almost any radio restoration measurement prob-

◆ The VTVM Versus the VOM

So what's so special about a VTVM and why would you want one? Well, in an ordinary VOM, the voltage or current being measured drives the indicating meter directly (although of course various series and parallel resistor networks are in also in the circuit depending on the measurement range you choose). The same is true for resistance measurements, which are voltage measurements as far as the VOM is concerned. So, the sensitivity of the instrument is completely dependent on the sensitivity of the indicating meter, which is usually a very delicate d.c. microammeter.

In a VTVM, the indicating meter is driven by a d.c. bridge circuit feeding into a vacuum-tube amplifier. The voltage being measured (VTVMs generally don't have a current-measuring function) upsets the balance of the bridge, creating a signal proportional to its value. The signal is then amplified many times before reaching the indicating meter. Although a VTVM is many more times sensitive than a VOM, its indicating meter can thus be made more rugged, which is an advantage on the test bench. And because the meter movement is isolated from

the voltage being tested, it is practically immune to the devastating damage that can be inflicted on a VOM accidentally set to a range that is too low.

The sensitivity of a VOM or VTVM is measured in terms of the resistance it presents to the voltage being measured, which in turn is a measure of the amount of current drawn from the test circuit by the meter. The higher the resistance, the lower the current drawn from the circuit, the lighter the load on the circuit, and hence the greater the sensitivity of the instrument.

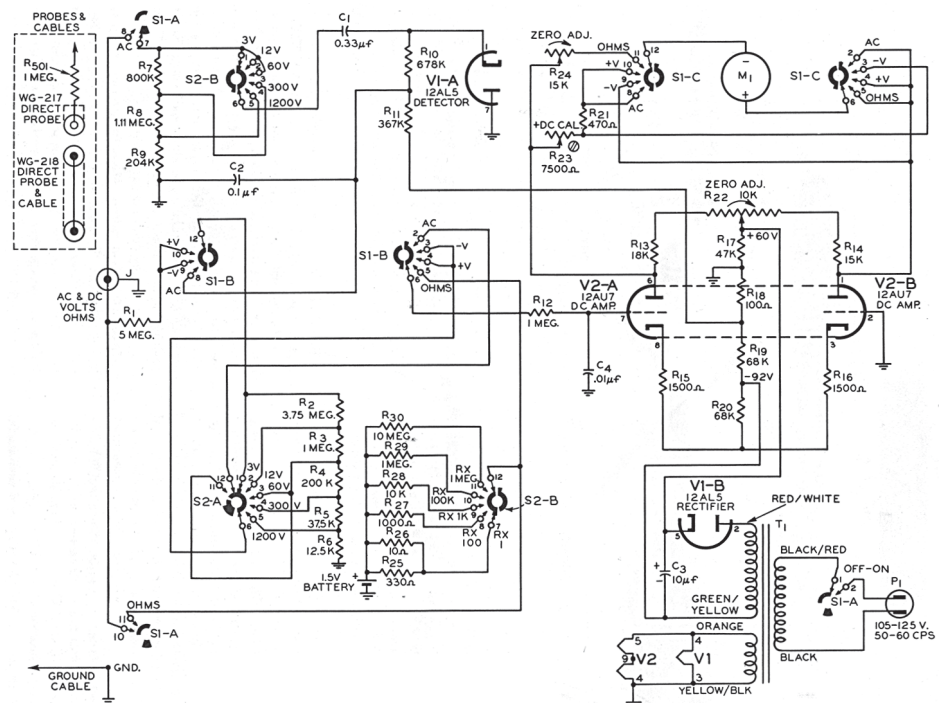
In a VOM, sensitivity is measured in "ohms per volt." Thus, the resistance presented to a test circuit by a good-quality (20,000 ohms per volt on d.c.) instrument set to a 10-volt d.c. scale would be 200,000 ohms. That doesn't draw a lot of current, but it can be sufficient to load down a sensitive circuit so that the voltage one is attempting to measure drops to zero. In a VOM, the resistance presented on *all* d.c. volts scales is typically 11 megohms. The high figure comes from the fact that the input of the instrument is the grid of a vacuum tube, not a resistance network driving a meter.



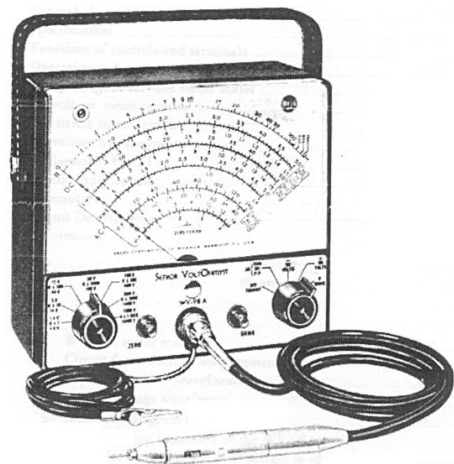
Junior Voltohmmist measures up to 1200 d.c. volts in five ranges; 1200 a.c. volts in five ranges; 1000 megohms in five ranges.

lem you might come across. Secondly, you can trust the calibration of your newly-purchased VOM and you can use it to recalibrate the VTVM you'll want to purchase later, when you begin to take on more advanced problems in radio restoration.

You'll definitely be involved in recalibration because VTVMs are no longer available new. You'll be picking out a good used one at a hamfest or antique radio flea market, where you'll find that these instruments are readily available. It's true that some of the inexpensive digital multimeters on the market today rival the sensitivity of VTVMs. But I, at least, find the swinging meter pointer of an analogue instrument much easier to read in typical radio servicing applications, particularly when tuning for maximum indications during a realignment process.



Schematic diagram of the Junior Voltohmmist. Note: 12AU7 dual triode is used as a two-stage d.c. amplifier.



Senior Voltohmmist measures up to 1500 d.c. volts in seven ranges; 1500 a.c. volts in seven ranges; 1000 megohms in seven ranges.

When it comes to a.c. measurements, the sensitivity of a VOM may drop to 10,000 ohms per volt. This is because of the extra current needed to drive the copper-oxide rectifier required to change the a.c. signal to d.c. that can be read by the indicating meter. The VTVM is also less sensitive on a.c., but still beats the VOM hands down. On a 3-volt a.c. scale, the typical VOM might present a resistance of 30,000 ohms, while the typical VTVM might offer a much lighter load of 600,000 ohms. The absence of the copper-oxide meter rectifier also results in a much flatter frequency response in both the audio and lower r.f. ranges.

◆ VTVM Applications

So what can you do with a VTVM on a radio restoration project that you can't do with a VOM? Not a lot, really. One of the most obvious uses for a VTVM is as a signal strength indicator for a realignment job. I've already shown you how to use a low-sensitivity VOM for this purpose (set it to a.c. volts and connect it between the plate of the audio output tube and ground via a blocking capacitor). But the enhanced sensitivity of a VTVM on a.c. ranges means that you can get a usable indication with the instrument connected across the speaker voice coil. Much easier and more convenient!

The VTVM is also very suitable for the preferred method of monitoring signal strength during realignment: measuring the AVC voltage on the control grid of the affected r.f., mixer, or i.f. tube. And speaking of control-grid measurements, the use of a VTVM to indicate the amount of negative bias on the grid of an oscillator stage of a receiver is one of the few ways to determine if the stage is operating properly.

The extreme sensitivity of the VTVM is reflected in its enhanced resistance-measuring capabilities. Where a VOM's resistance scales might top out at 20-megohms, a typical VTVM will measure up to 1000 megohms. This can be helpful in making leakage resistance measurements across small capacitors, cables, or other components where even a small amount of leakage might be harmful.

Other conveniences of a VTVM are that negative d.c. voltages can be made to read up-scale by turning a front-panel switch instead of

reversing the positions of the test leads. The VTVM can also be set for a zero-center position so that positive and negative d.c. voltages will deflect the needle on opposite sides of zero. This function is helpful in the alignment of FM discriminator circuits.

Disadvantages of the VTVM as compared with the VOM are that the former must be connected to a.c. power and the latter operates strictly on its own internal battery (which powers only the ohmmeter function). The accuracy of the VTVM is usually not as great as that of the VOM because of all the circuits that must be in proper adjustment for the VTVM to be in good calibration. Of course the VTVM *does* have a means of adjusting calibration, as we'll see later, and can be set for reliable measurements as long as the instrument as a whole is in good health. Finally, one always reaches for the VOM when making a spur-of-the-moment measurements. A VTVM requires significant warm-up time after being turned on and its "zero" pointer setting will drift annoyingly if this is not observed.

Though this more sophisticated instrument really won't help a tremendous amount on the average radio servicing job, most electronics hobbyists eventually acquire one for their benches. It's a nice feeling to have this neat instrument at one's disposal. And, of course, if one needs to measure two different voltages, or a voltage and a current, at the same time, the VTVM makes a very welcome adjunct to the shop VOM.

◆ Acquiring Your Instrument

To acquire a good VTVM for a nice low price, just keep your eyes open at the next couple of electronics swap meets you attend. Price inflation has not yet hit test instruments as it has most other types of electronic and radio gear. Perhaps it's because most folks don't get into repair work or maybe the perception is that a used test instrument can't be relied on to perform its function accurately and reliably.

Because test instruments are available so cheaply, I'd advise passing up the hobby-grade VTVMs built from kits, such as those by Heathkit and Eico. You might consider purchasing one of these if it appears to be absolutely mint, comes with the manual and probe, and is bargain priced. Even at that, you won't know how well it has been assembled until you get it home.

I'd also avoid laboratory-grade equipment such as the massive instruments by Hewlett-Packard. Documentation for these is expensive if it doesn't come with, and service and calibration procedures can be daunting to the hobbyist. My advice: look for instruments designed for the radio/tv serviceman. These are of much better quality than hobby instruments and usually not too complex for the amateur to maintain.

When talking about service-type VTVMs, two models come immediately to mind — both manufactured by RCA. These are the Junior Voltohmmist (Model WV-77A) and the Senior Voltohmmist (Model WV-98A). They have similar capabilities, but the Senior unit has a larger indicating meter and its measurement scales are broken down into more ranges than those of the Junior unit. Either of these instruments will make an excellent addition to your service bench, and both

are commonly found at electronic flea markets.

Knowing that I'd eventually be writing about VTVMs, I had kept my eyes open for these models for the past several months. I found a Junior Voltohmmist at the big Antique Radio Club of Illinois meet last August. It looked great, except for its cracked and taped up probe, and came complete with manual. Price: \$5.00. The Senior Voltohmmist turned up at a local hamfest run by one of the larger amateur radio clubs in my area. It came with its probe, but no manual. It was marked \$5.00, but as I picked it up and eyed it dubiously (because of the distressed-looking finish on its case), the owner said "four dollars?" Still dubious, but really wanting to include a "Senior" in these articles, I went for it.

During the next issue or two we'll go through these two instruments together, replace the old paper-and-wax capacitors, apply power, check for proper operation, and tweak the calibration as needed. So far, I've gone only as far as to open both cases and look inside. My biggest worry was that the instruments had been stored with exhausted batteries installed (each instrument is equipped with a 1.5-volt cell needed for the ohms measurement circuit). However, I had worried needlessly. In both cases, modern alkaline D-cells had been soldered in to replace the zinc-carbon RCA originals. The condition of these is unknown, but they have not corroded — much to my relief!

Otherwise, the insides of both instruments looked almost pristine.

More on these interesting instruments next month!

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Matching: What, When, and How?

"Matching" is a means of insuring maximum transfer of energy between electrical circuits. For instance, for best weak-signal reception we would want a handheld VHF-UHF scanner to receive the maximum possible amount of the RF energy that is captured by its antenna. This can be accomplished by making sure that the impedances of the source of energy (feedpoint of the antenna) and the load (the receiver's antenna-input circuit) are the same value (i.e., are matched).

When the source and load impedances are not the same value these circuits are "mismatched," and less than maximum power transfer takes place. To obtain a match when circuits are mismatched we can either change the impedances of the circuits to make them match, or add extra circuits called "matching circuits" to create a match between source and load. Some matching circuits are discussed below. Although we are discussing antenna applications here, matching is important in many other types of circuitry.

◆ Matching in Antenna Systems:

In the example given above the antenna was connected directly to the receiver's antenna-input circuit. Many installations utilize a feedline between the antenna and receiver and/or transmitter. When a feedline is used there are two places in the signal path where matching should be considered. These are the connection of the antenna to the feedline, and the connection of the feedline to the receiver or transmitter.

During reception the antenna is a source of RF current to the feedline (load), and the feedline

is a source for the receiver's antenna-input circuit (load). For transmission the transmitter is a source to the feedline (load), and the feedline is a source to the antenna (load).

◆ When Is Matching Useful?

At first thought it might seem that matching is always desirable. However, there are situations where matching may not be worth the effort or expense it requires. For instance, quality of reception on the HF and lower bands is determined primarily by the amount of received-signal level as compared to the received-noise level. This is known as the signal-to-noise ratio, or S/N.

Once a sufficient amount of signal for decent reception is available from the antenna system, it is usually of little value to increase the signal strength by improving matching within the antenna system. This is because matching increases the received-noise level (which is usually somewhat high) along with the received-signal level. Thus, no significant improvement in S/N is obtained.

On the other hand, when received-noise is low, reception is often improved by correcting mismatches in the antenna system. Low received-noise conditions usually exist on VHF and higher frequencies. Low received-noise conditions also are found at times on the upper HF frequencies, particularly in rural areas, in winter, and in the upper latitudes. Antenna-system matching improves reception of weak signals in these low received-noise situations.

For transmitting applications we are often concerned with radiating a maximum of power, and so matching the sources and loads in the an-

tenna system becomes important. On the other hand, there are situations where matching is not so important, particularly at the transmitting antenna-feedline connection. An example of this occurs with the use of an antenna for multiband use. The antenna's feedpoint impedance changes with changes in frequency, and so, on some bands, it will not match the feedline's impedance. Significant mismatch occurs. But if the losses in the feedline are quite low, then most power is actually radiated.

With this kind of antenna, the fact that mismatches can be tolerated at the antenna-feedline connection allows us to have a decent multi-band antenna without the trouble of correcting the mismatches.

If high power or lossy line is used, then the high SWR caused by mismatch at the feedline-antenna connection can cause heating or damage to the line if the breakdown voltage of the line is exceeded. A good match is needed at the transmitter-feedline connection for this system, as for most transmitting-antenna systems. Mismatches at this connection can lead to low radiated power and possible transmitter damage.

◆ Standing Wave Ratio (SWR):

When a source and load are impedance-matched then all the power from the source is accepted by the load. That's the ideal situation. But when there is a mismatch, some of the power is reflected from the load back toward the source. The greater the mismatch, the greater proportion of power reflected back from the load.

When the mismatched source is a feedline, then the reflected power travels back down the line. Along the way it combines with the power moving forward on the line toward the source. The forward and reflected power combine resulting in a distribution of voltage ranging from maximum to minimum at regular, stationary intervals along the line. The ratio of these maximum and minimum voltage levels on the line is known as the "voltage standing wave ratio."

There are also standing waves of current on a mismatched line; however, most discussions deal with the voltage standing wave ratio, and refer to it as "SWR." A high SWR value means that significant power is being reflected from the load back toward the source. When significant power is involved, high SWR may cause damage due to voltages and/or currents which exceed the maximum ratings of the feedline. Depending on the application, and on how lossy the feedline is, a high SWR may create a problem, or it may be no problem at all. We'll discuss this further in a future column.

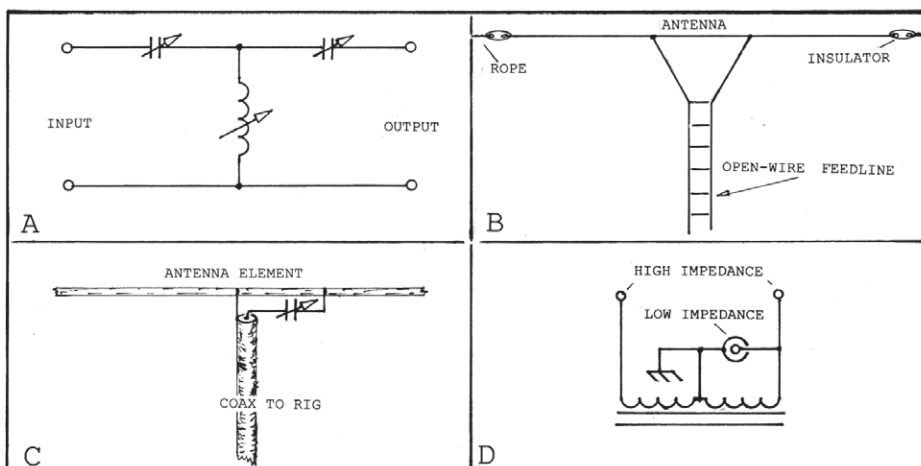


Fig. 1. Some common matching circuits: A transmatch (A), a delta match (B), a gamma match (C), a 4-1 balun (D).

This Month's Interesting Antenna-Related Web site:

Here's a glossary covering a number of antenna terms, as well as many other telecommunications terms:

<http://www.its.bldrdoc.gov/fs-1037/fs-1037c.htm>

Another site offers a discussion of impedance matching, and a game that allows you to match impedances as well as see the results on a Smith chart:

<http://www.tm.agilent.com/data/static/eng/tmo/Notes/interactive/an-95-1/classes/imatch.html>

◆ Getting Circuits Matched:

The simplest matching solution at any junction of two circuits is to select or design the circuits so that no modification is needed. For example, using a 50-ohm coax feedline with a groundplane antenna having a 50-ohm feedpoint impedance.

On linear antennas, such as a dipole, the impedance of the feedpoint varies depending on where the feedpoint is located. For example, feeding a halfwave dipole in its center, as is typically done, gives a relatively low feedpoint impedance, somewhere between 25 and 100 ohms. Fed at either end, as in a Zepp feed, the feedpoint impedance should measure in the low thousands of ohms. Such an antenna's feedpoint impedance increases progressively from its center toward either end.

By choosing the appropriate point along an antenna's length, any of a wide range of impedances may be selected as the antenna's feedpoint. The Windom antenna utilizes this principle.

Matching at the feedline-receiver/transmitter connection is usually accomplished by use of any of a variety of circuits known as "antenna couplers," "antenna tuners," or "transmatches" (fig. 1A). When using a transmatch, the degree of matching can be determined by measuring the value of SWR at this connection. The transmatch is tuned for minimum SWR, the lowest value possible being 1:1. SWR values of up to 2:1 are usually acceptable for solid-state transmitters. For tube-type transmitters the SWR can often be considerably higher without causing a problem. Some popular circuits developed for matching mismatched antenna-feedline connections are also shown in fig. 1.

Baluns are devices which are used to couple balanced sources or loads to unbalanced sources or loads. Ununs are devices for coupling unbalanced sources and loads. Both baluns and ununs can be constructed to provide impedance transformation useful in matching unmatched circuits. For instance, a 4-to-1 balun can be used to match a 300-ohm folded dipole antenna feedpoint (balanced) to a 75-ohm coax feedline (unbalanced).

◆ And So:

This has been a relatively brief survey of matching and matching circuits. For more detailed information on these topics consult books such as *The ARRL Antenna Book*, *Joe Carr's Practical Antenna Handbook*, Moxon's *HF Antennas for All Locations*, the *Radio Communications Handbook* of the RSGB, or the *ARRL Handbook*.

RADIO RIDDLES

Last Month:

I asked: "OK, we can make functional model antennas. Can we make functional model feedlines too?"

Well, there are computer models of feedlines, but I haven't heard of functional model feedlines. Of course, it is possible to scale a feedline down in size and have very small feedlines with characteristic impedance equal to much larger lines. But in doing this some important feedline characteristics are changed. These changes include a decrease in breakdown voltage, and increased signal loss. Thus such a line is not a faithful model of the larger line.

This Month:

Coax feedline can be manufactured with any of a wide variety of impedances. Why standardize on 50-ohms for radio applications, 75-ohms for CATV, and other values for other applications?

You'll find an answer for this month's riddle, another interesting, antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

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Tk500 Software for the Yaesu VR-500



The Yaesu VR-500 is a shirt-pocket-sized receiver which tunes AM, FM, CW, and SSB signals up to 1300 MHz (reviewed in Feb. 2000 *MT*). I take the VR-500 or an ICOM IC-R2 (Apr. 1999 *MT*) on almost every trip. The VR-500's ten memory banks, 1000 channels and alphanumeric labels are major assets.

Programming large numbers of frequencies using the keypad is tedious, so I prefer to program the VR-500 using software. Until now, the only software available for programming the VR-500 has been RT Systems' ADMS-3 (Feb. 2001 *MT*). ADMS-3 is designed to work only on computers running a Microsoft Windows operating system, which leaves us Linux and MacOS X users out in the cold.

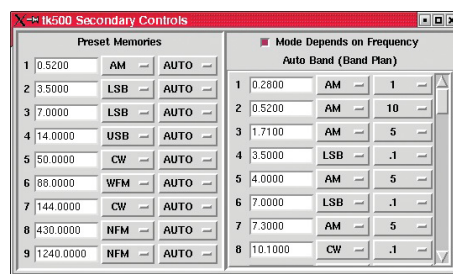
I wrote the tk500 software utility to permit Linux and MacOS X fans to program our VR-500s, too. Tk500 works well on Linux, Windows 98, and Windows 2000. It will probably work on MacOS X and I'm looking for beta testers willing to try it on their Mac systems. You can download tk500 from my web page at <http://members.core.com/~parnass>.

Tk500 lets you change most of the VR-500's settings. To change the memory channels, you export them to a csv (comma-separated values) file, then use a spreadsheet or text editor program to make the alterations. Then, you import the updated csv file into tk500 and write the information to your radio.

Adapter Cable

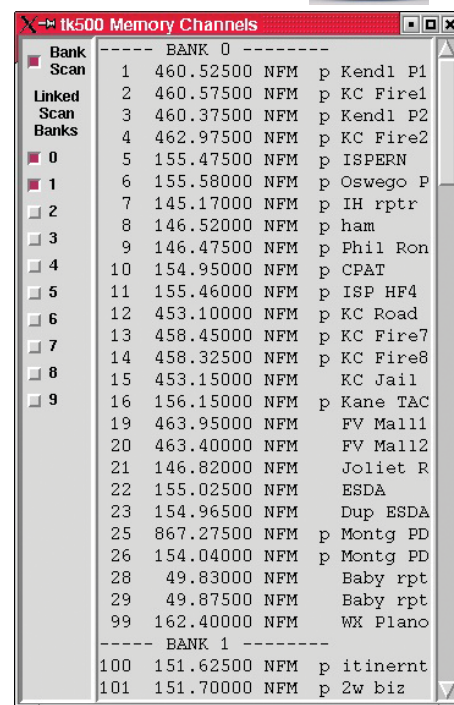
Before using tk500 or RT Systems ADMS-3, you must connect your VR-500 to your computer's serial port using a suitable level converter cable. You can build a converter cable or buy one from RT Systems, P.O. Box 12188, Huntsville, AL 35815, telephone 1-800-750-9689 or visit their web page at <http://www.rtsars.com>.

I used the cable furnished with the ADMS-1 software for programming the FT-50R walkie-talkie, but without the 3-pin to 4-pin adapter. This cable has served well for programming the ICOM IC-R2 and IC-Q7A, too.



Unmask Hidden VR-500 Features

One VR-500 owner found after his battery ran low that the VR-500 supported two new menus: NAM (narrow amplitude modulation) and USER PORT. Another owner enabled the new menus inadvertently by pressing a combination of keys which he cannot recall.



bination of keys which he cannot recall.

Dan Wanchic, WA8VZQ, tested and compared his VR-500 in both NAM and AM modes using an HP 8920A Communications Test Set. The NAM mode showed significantly reduced AM bandwidth. Here are his results at 10 MHz:

AM mode: 6 dB bandwidth 18.2 kHz
AM mode: 60 dB bandwidth 25.0 kHz

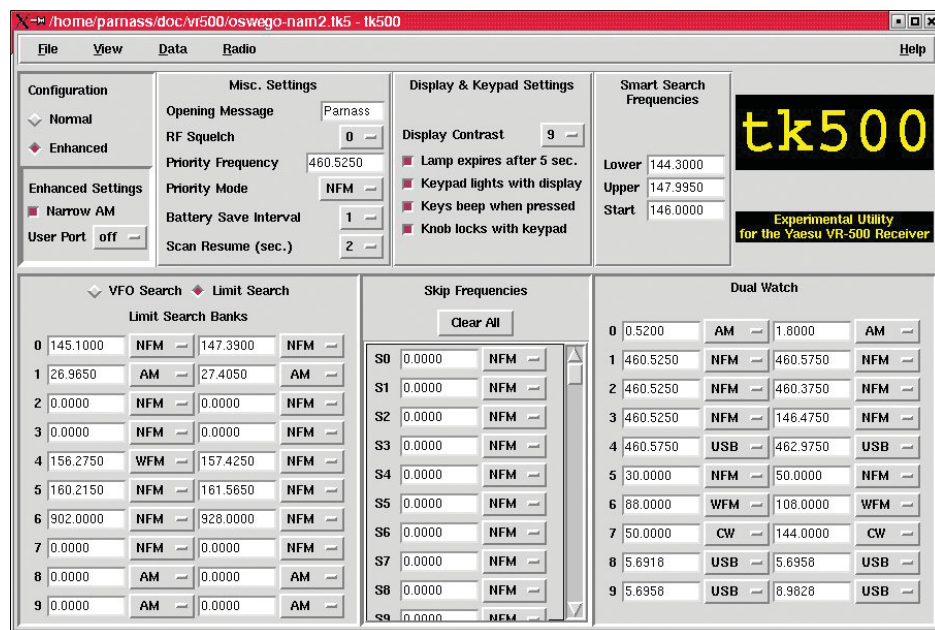
NAM mode: 6 dB bandwidth 7.1 kHz
NAM mode: 60 dB bandwidth 11.5 kHz

After finding that the new NAM mode had been enabled in his VR-500, one fellow used RT Systems ADMS-3 software to save his VR-500's memory image to a file, named NAM.rdf. He shared the file with other readers of the VR-500 Yahoogroups email list, and it may be downloaded from the VR-500 files section at [Yahoo.com](http://www.Yahoo.com).

Loading the NAM.rdf file into a VR-500 enables two new menu items within the radio: NAM and USER PORT.

The function of the USER PORT menu remains a mystery.

The NAM menu lets you enable or disable NAM. Once you enable NAM, it replaces the conventional AM mode, and the VR-500's



display actually shows the letters NAM instead of AM on channels where AM was the designated mode.

You can use ADMS-3 software to customize a personal copy of NAM.rdf and write it to your VR-500. You don't need a copy of NAM.rdf if you use the tk500 program. Experiments conducted by Paul Martin, N8ULS, and other list members helped me find how to enable the "hidden" VR-500 menus using tk500 software.

There is, however, an interaction between the two new menus and Preset Mode (p. 16 of the VR-500 Operating Manual). The new menus disappear after the VR-500 is placed in Preset Mode and the radio must be reloaded to restore them.

For Programmers Only

Tk500 is written in Tcl/Tk, an excellent scripting language for creating graphical programs which work on several operating systems. You can learn more about Tcl/Tk at <http://www.tcltk.com> and <http://mini.net/tcl/0.html>.

Tk500 communicates with the VR-500 through a serial port using these parameters: 9600 bps, even parity, 8 data bits, and 1 stop bit. Tk500 uses blocking IO, so it can "hang" if the radio becomes disconnected accidentally during a data transfer.

The VR-500 sends and receives binary

data, except for the opening message and memory channel labels.

Tk500 reads and writes a 15616 byte memory image from and to the VR-500 and can store the image in a disk file.

I could not obtain any information about the VR-500's computer interface or memory image layout from Yaesu USA, but I found the notes Dan Wanchic posted on the VR-500 email list. Dan had identified the function of several bytes in the RDF file layout after experimenting with his VR-500. The VR-500's 15616 byte memory image is embedded within each 69818 byte RDF file, so Dan's information was very helpful.

◆ Pager Becomes Pillow Speaker



I listen to a PRO-2005 scanner late at night when I'm in bed and others are asleep, but I don't wear headphones. Rather than buy a commercial pillow speaker, I salvaged the case and speaker from an old Motorola voice pager.

I enlarged one of the holes in the top and installed a 1/8" miniature phone jack which I wired

to the speaker element. A patch cord with a male 1/8" plug on each end connects the new extension speaker to the external speaker jack on the PRO-2005 rear panel.

A simpler solution would have been to solder a 3 or 4 foot 2-wire cord to the speaker and solder a plug on the other end, but I have several spare patch cords and prefer a modular approach.

The pager-now-speaker is shallow enough to fit under the edge of my pillow and the belt clip holds it to the pillow case. It works so well that I fell asleep while testing it!

◆ Spare Fuse Holder Tip

Fuses fail when their current limit is exceeded, but they can

also fail due to what is termed "fatigue." I use a plastic film canister fastened to my radio's DC power cord to hold spare fuses. I drill two holes in the side of the canister and thread a plastic cable tie through the holes and around the power cord, as shown in the photograph.



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AirNav Suite - Sweet!

A few years ago we looked at a new program called AirNav. This revolutionary program promised to graphically track and display aircraft positions by using Aircraft Communication and Reporting System (ACARS) radio transmissions. Initially, the program's claims made me a bit skeptical. However, after connecting the audio output of my airband scanner to my computer and running AirNav version 1, I was truly impressed with the results!

Superimposed on a map of my local states were aircraft symbols, identifying each craft by tail number and giving other pertinent information. As the receiver picked up new ACARS data bursts the display was updated with the new position of each aircraft.

Well, the people at AirNav have been busy over the last few years adding many new and useful features to what is now version 4 (We'll look at AirNav 4 next month). They now have released a whole suite of standalone airband programs including AirNav Selcal Decoder 1.1, AirNav ACARS Decoder 1.1 and AirNav Internet Lite 1.1. I'm

sure most of you recognize the function of the first two programs from their names.

ACARS is a data burst transmitted by enroute aircraft in the VHF (around 13 MHz) airband. The data may contain: flight number, aircraft registration number, routing information, position information, aircraft maintenance details, weather and special needs. The positional information from ACARS decodes is utilized by AirNav as its source of data.

Selcal are a set of audio tones whose frequencies are assigned to a specific flight. Once dialed in, the aircraft's receiver "listens" for the specific tones before it allows reception of a signal. This makes for a quieter cockpit environment and less confusion over who the ground station is calling. The Selcal method is usually utilized with long distance flights and is transmitted over shortwave by stations such as Gander and New York Radio. We'll try each of these programs next time.

♦ ACARS Without Radio?!

The title of the last program, AirNav Internet Lite, was puzzling to me and piqued

my interest. "What is AirNav Internet?" I thought out loud as I loaded the program. The program was downloaded from the AirNav website at <http://www.airnavsystems.com>. A demo version is available at no charge and the full version, which we will see, costs \$64.95.

I tried AirNav Internet Lite on a Pentium II 350 MHz, machine, with 64K RAM running Windows 98 and using a 56K dialup modem connection to the internet. The download resulted in a Zip file (around 1.1 Meg in size) which was easily unzipped and installed within a minute. The installed file occupies around 18 meg of hard drive space with the basic number of maps.

However, upon running AirNav Internet Lite my dialup connect to the internet was automatically started. I don't know about you, but I get very concerned when programs try accessing my internet connection unexpectedly! But I trusted the good people at AirNav and allowed the internet connection to be made. "Where was I being connected to?" I wondered watching for some information to be displayed on the screen. Five maps, in reduced mosaic were displayed. These maps were of: the whole world, Australia, USA, Pacific Ocean and the North Atlantic. "Great. Now what?"

♦ Patience and Trust Are Rewarded

At first, nothing seemed to be happening. But then I noticed the bar graph in the small box at the upper left labeled "Download Complete" was moving. Also the bar graph below it labeled "Processing ..." was doing something as well.

After about 2-1/2 minutes, suddenly the screen came alive with symbols being written all over five maps. The resulting screen is shown in Figure 1. Keep in mind no radio connection is in place, so all the data is coming from a site on the internet instead of from "off-air."

♦ Today - the World!

It appeared that what I was seeing was ACARS derived data collected from aircraft from all over the globe, not just within my few hundred mile VHF radio range! Clicking on the world map opened it up to full screen, Figure 2. I was impressed when I

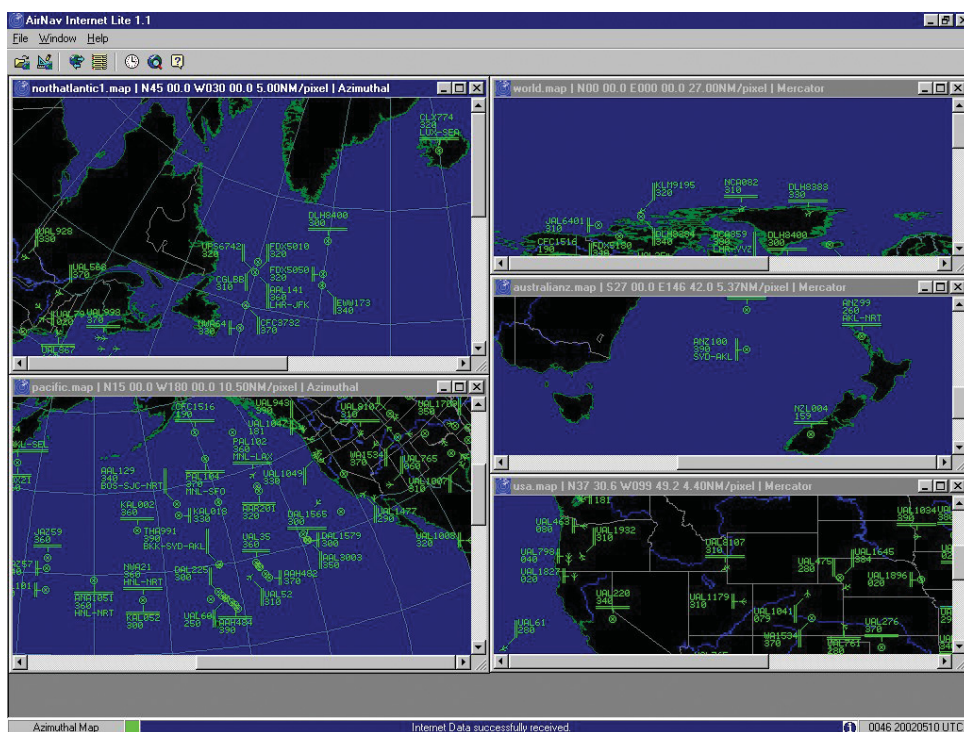


Figure 1 - AirNav Internet Lite 1.1 In Operation

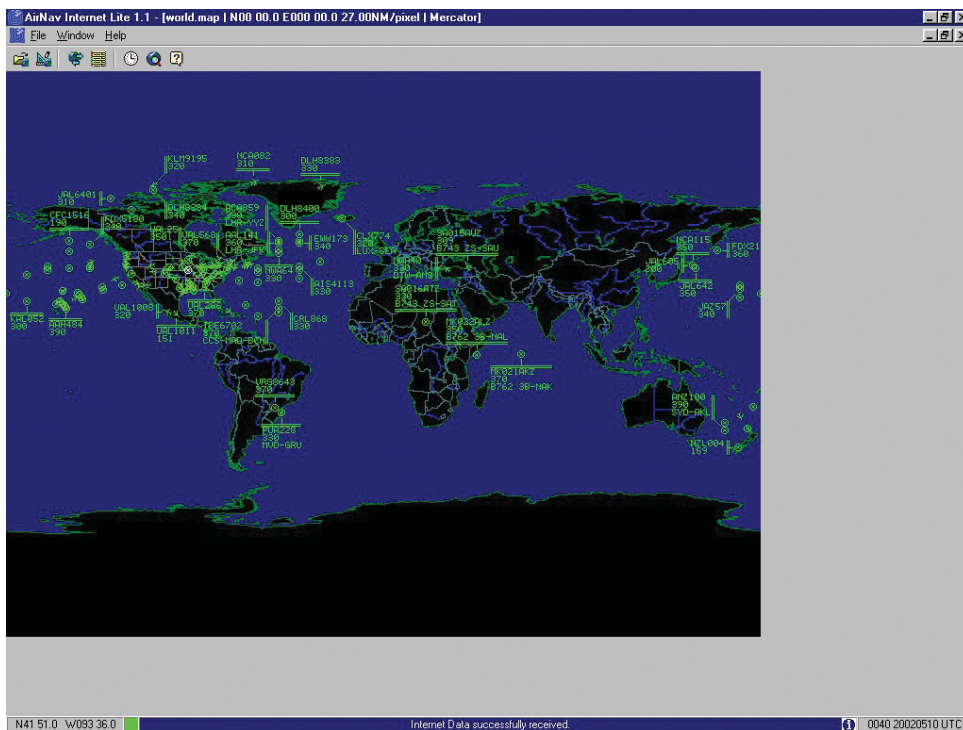


Figure 2 - The Whole World In Flight!

realized the power of what I was seeing. I was seeing was most of the commercial airlines (and some business aircraft) currently in the air all over the world.

As I was watching, the display seemed to freeze for 20 seconds and the screens were updated. Updating can be performed manually by pressing the F3 key at any time.

Placing the cursor over any aircraft symbol opens a more detailed data display concerning that specific aircraft.

◆ Other Features

AirNav Internet Lite has lots of other built-in features. One of my favorites is the Electronic Flight Progress Strip (EFPS) which is accessed by clicking the fourth symbol from the left below the "Window" at the top left of the screen. This results in a vertically arranged list of "strips" similar to the pieces of paper which air traffic controllers used to follow and "hand-off" flights to other controllers. This system has been replaced in most parts of the world by an on screen electronic flight labeling and following system.

The flight progress strips display all aircraft in a selected region and can be sorted by: flight number, aircraft type, aircraft registration or three other methods. See Figure 3. I found that using the flight number sort was very useful since it groups all aircraft from each different airline company together. Therefore, if you are looking for a specific flight – for example, American Airlines 234 – it is very easy to see all the American Airlines flights on the strips and then check down it see if 234 is in the list.

◆ More Features

Under the "File" menu the "Track/

Utilities" menu allows lots of map manipulation. For example, if the airspace gets too crowded you can avoid the overlap of aircraft labels. Also under the same menu you can choose to display only flights originating during a given period – for example, the last 30 minutes.

◆ Downloading Additional Maps

The AirNav website has lots of useful information. Immediately useful to all AirNav

and AirNav Internet Lite users is the map download area. From here users can download detailed maps of an area such as New York. The files are Zipped and quickly downloaded on a 56K dial-up connection.

◆ Where Is This Coming From ?!

After playing with AirNav Lite for a few hours it again dawned on me I was not connected to a receiver. So, what is being displayed and what is the source of the data? Well, the answer to the first question is that 80 to 90 % of current flying intercontinental flights are displayed. The program indicates that the data is also derived from AMDAR (meteorological radio transmissions).

A small catch is that due to the centralized collection and processing, the displayed information is delayed a minimum of 10 minutes from reception. Therefore the data is near real-time.

As for the source ... I've yet to find out the exact URL. However, I suspect it is somehow connected to the Arinc Company which provides aircraft communications worldwide. See <http://www.arinc.com>. If any of you can shed more light on the subject please email me so we can share it with our readers.

◆ Just the Beginning

AirNav Internet Lite 1.1 performed perfectly without a glitch. The fact that you don't need a radio makes it a natural for travelers with an internet connection. At \$65 the price is a bit high, but well worth the performance.

Next month we'll look at the other programs in the AirNav stable. Till then, keep

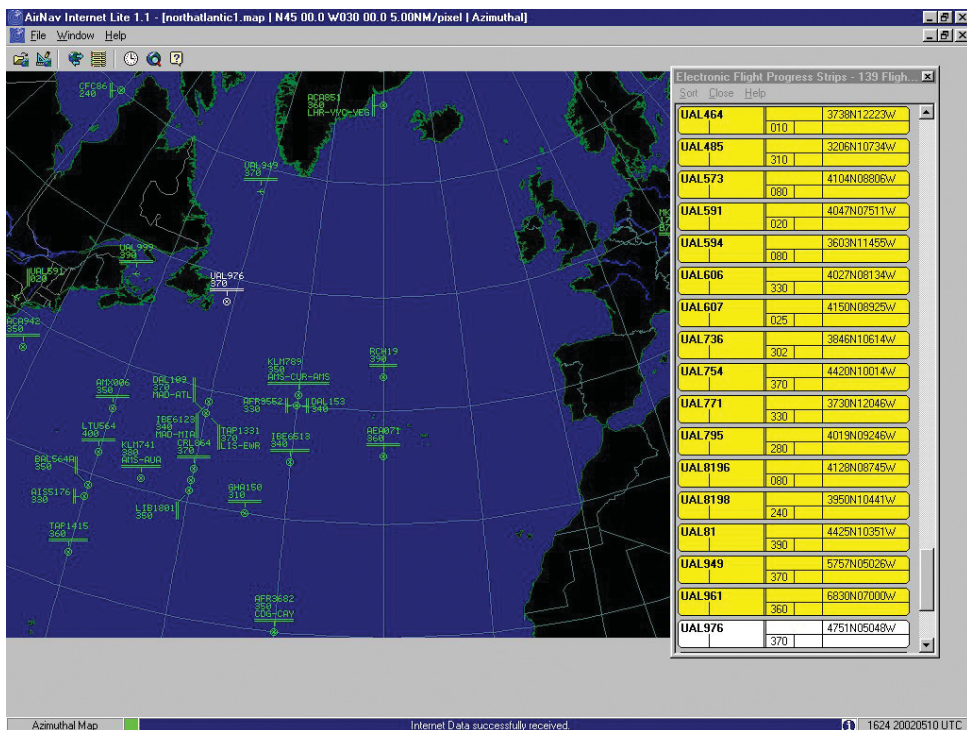


Figure 3 - Electronic Flight Progress Strips (EFPS) Display

Ten Tec RX-350 Receiver

By Bob Grove

Slowly but surely, manufacturers are acknowledging the future of radio equipment design. In spite of the reluctance to change, computer control has invaded technology on a permanent basis.

The first company to make a permanent mark was WiNRADiO with their continually-expanding catalog of computer-hosted receivers. ICOM made a brilliant entry with their PCR-1000, and Ten-Tec has entered the foray as well with their software-based transceivers and receivers.

But the new Ten-Tec RX-350 is in a class by itself. Abandoning the contemporary methodology of building an all-electronic receiver and simply manipulating its functions with a computer, this triple-conversion receiver (45 MHz, 455 kHz, 12 kHz) takes it one step further by replacing the usual analog final IF stage with digital signal processing (DSP).

This technique allows a level of signal processing not previously possible; instead of working with detected audio or filtering an IF signal and attempting to correct its aberrations for better reception, the signal itself is converted into a digital stream and massaged for maximum intelligence, a procedure which results in enormous improvements in signal-to-noise ratio while preserving modulation integrity.

Ten-Tec wisely took the best features of their successful product line and incorporated them into a basic receiver, then left the final tuning up to software; this way, the receiver can be updated periodically in software without ever touching the circuit components. It's a proven method established by WiNRADiO, but that product line requires a host computer. The RX-350 can be operated as a conventional, stand-alone receiver without even attaching a computer.

It's a large receiver, measuring 12 inches wide by 5-1/2 inches high by 12 inches deep, not including knobs and connectors, and it weighs 12 pounds. Its internal 3-inch speaker is top-mounted toward the right front edge. The rear panel is alive with various jacks for

mute, squelch, timer, line output, external speaker, remote control, power, and antenna. A serial interface allows the receiver to be entirely operated from a host computer via an ASCII command set.

Four plastic bumper feet prevent marring of the tabletop surface and a bail hinge can be swung into place to elevate the receiver toward the user.

◆ Basic Specs

Operating from 120 VAC, 240 VAC (optional cord), or 12 VDC (cable provided), the RX-350 is a full-function receiver which tunes the 100 kHz-30 MHz spectrum. It offers an excellent, back-lit LCD which sports a giant, 3/4 inch frequency readout and announces other panel settings as well as date and time. An on-screen menu allows the operator to set preferences for the receiver's various functions. An alphanumeric tag invites custom identification of memorized frequencies.

Detection modes include AM, synchronous AM (with selectable sideband), FM (15 kHz for communications), USB, LSB, CW, and digital, with appropriate offsets.

Favorite frequencies and settings may be stored in 1024 scannable memory channels divided into eight banks. Antenna connections are provided for unbalanced coaxial cable (SO-239, 50 ohms nom.) and random wire (push terminals, 450 ohm nom). Sensitivity is rated at 0.35 microvolts for 10 dB S+N/N at 3 kHz bandwidth in the SSB mode.

Selectivity provided by the DSP scheme

is exceptional; there are 34 built-in filter bandwidths from 300-8000 Hz, each with a shape factor (-6 and -60 dB) of 1.5:1 or better. Utilizing this feature alone is an exceptional experience, and coupled with the passband tuning (adjustable +/-2 kHz) really enhances single-signal reception.

Dynamic range is spurious free for 90 dB, with a third-order intercept point (intermodulation) of +10 dB.

◆ The Listening Experience

The basic operation of the RX-350 is quite intuitive; plug it in and follow the panel legends. A single rotary encoder control is used for both audio and RF gain by pressing the appropriate RF or AF button above it. The multi-turn operation of this control gives it a fine-tune feel, and a bar graph on the display informs you of the percentage of full scale you have rotated it.

AGC timing may be selected as fast, medium, or slow for optimum reception of AM, SSB, and CW signals without pumping. The autoscan/search routine stepped at a rapid 60 channels per second. The adjustable squelch function worked smoothly on all modes. Synchronous detection of AM signals, however, was not working on our loaner, so we can't report on that function.

A large, two-inch, skirted tuning knob is used for frequency slewing of the two VFOs. There is no numeric keypad, so direct frequency entry is not possible. Instead, up/down keys are used for rapid step excursions across the spectrum. An optional model 302 remote keypad with tuning knob, user-assignable controls, and a six-foot interconnect cable is available.

The receiver offers a nice spectrum display option, sweeping a span from as narrow as 240 Hz up to 2.4 MHz wide and showing active frequencies as on-screen spikes in less than one second. The receiver's tuned frequency is indicated by a cursor that can be moved through the spectrum display to identify signals.



While the bar graph S-meter is calibrated for the conventional 50 microvolt signal equating S-9, the entire meter is compressed into a one-inch space, with each 1/8-inch reticle division representing nearly 4 S-units (20-24 dB) of signal level change. While an adjacent numeric readout in 1/8-inch characters is provided, it is distracting to have to refer constantly to a changing number to get a fix on relative signal strengths. But it does provide reference levels.

◆ Outstanding Signal Processing

Perhaps most astounding of all is the noise blanker feature, pruned to near perfection by Ten-Tec's years of communications

experience in commercial and military radio design. In any mode experiencing noise interference, a simple press of the noise reduction key virtually eliminates background hiss and noise on weak signals, allowing the recovered audio to seem suspended in near silence. And, if there's a residual whistle or heterodyne interference, a press of the automatic notch filter attenuates that as well.

The internal speaker is capable of more than enough room-filling audio with low distortion while driven by its 1 watt amplifier. Admittedly, a 3-inch speaker can't provide outstanding audio; highs are brilliant at full 8 kHz bandwidth, and can be attenuated by reducing the bandwidth, but nothing can help the missing bass, so several alternatives are provided.

Stereo or mono headphones can be plugged into the front-panel phone jack; an external recorder or amplified sound system may be plugged into the adjacent line-out jack or a rear-panel jack; or an external speaker can be plugged into the rear-panel jack assigned for overall improved sound.

◆ The Bottom Line

We were favorably impressed with the new Ten-Tec RX350 receiver. It offers an excellent array of cutting-edge features, considerable applications flexibility, and performance to justify its \$1199 price tag. The RX-350 is available from Ten-Tec, Inc., Sevierville, TN 37862. For more information, visit their web site at <http://www.tentec.com>.

Scanning Report continued from page 29

"All the communications training and monitoring has helped me in many ways," Elena continued. "I'm confident in most every situation and I'm very aware of my surroundings. I can verbally communicate what I need and what I'm thinking, both in professional and personal situations."

Regarding her musical performances, the technical side of scanning has also been a benefit. Elena has a thorough knowledge of vocal frequencies, microphones, and recording systems. Audio elements such as frequency response, harmonic distortion, and sound compression are discussed equally with keyalities, tonalities, harmonies, ranges and tempos.

Elena's interests are a whirlwind of technology and talent. Her tour of life is filled with ever-changing adventures, locations, people and performances. But, it's just another mission for our singing-modeling-flying-shooting-designing-computing-scanning soldier of diversity, Elena Machado.

◆ Video Scanning

In the May issue of *The Scanning Report*, Gil Young said he'd be willing to purchase an Icom IC-R3 if frequencies and video reception at NASCAR events can be confirmed. Well, we now have the frequencies. Doug Smith responded with the following detailed message:

"Before a recent race at the new Nashville SuperSpeedway (in Lebanon, TN) we were advised that the car cameras would be using all seven 2 GHz broadcast auxiliary frequencies. From 47CFR74.602 (U.S. Code of Federal Regulations), the frequencies in question are:

1990-2008 MHz (1999.0 center, channel 1)
2008-2025 MHz (2016.5 center, channel 2)
2025-2042 MHz (2033.5 center, channel 3)
2042-2059 MHz (2050.5 center, channel 4)
2059-2076 MHz (2067.5 center, channel 5)
2076-2093 MHz (2084.5 center, channel 6)
2093-2110 MHz (2101.5 center, channel 7)

"There is also a 2.5 GHz band they might use. There are three channels in this band: 2450-2467 MHz (2458.50 center, channel 8)

2467-2483.5 MHz (2475.25 center, channel 9)
2483.5-2500 MHz (2491.75 center, channel 10)

"Most equipment treats this as an extension of the 1990-2110 MHz band. I am not 100 percent certain of the parameters of channel 10...it doesn't appear in my copy of the FCC regulations...but definitely exists on the equipment."

"You are likely to hear references to these channel numbers on the voice-only Broadcast Auxiliary channels (450-451 and 455-456 MHz, especially) while remote broadcasts are being 'lined up.' I suppose that's the reason they don't have a camera in every car...there just aren't enough frequencies!"

"These are the same frequencies used for most terrestrial TV live remotes for remotes during newscasts, etc. Channels 8, 9 and 10 are in an unlicensed 'ISM' band (Industrial - Scientific - Medical) and are subject to interference from...microwave ovens, wireless computer networking gear, along with cordless phones and who knows what else. Because of the interference these channels are rarely used."

"I have also seen black-and-white surveillance cameras operating in these channels. They appear to be operated by some branch of the Metro Nashville government as they show various well-known public buildings."

"Some of the 1990-2110 MHz band is being re-farmed for other use. Eventually these channels will be narrowed and broadcasters switched from FM to digital transmission. (In some cities, digital transmission is already in use.)"

"One of our truck operators has an IC-R3 and has received his truck on it. He did say some kind of trick was necessary...I'm afraid I don't recall exactly what he did. Might have had to tune to the image rather than directly to the center frequency."

Thanks, Doug, for another outstanding contribution. IC-R3 owners, please send me your reception reports, tips and tricks concerning "video scanning."

◆ On the Keyboard

Please send your spring and summer monitoring stories, frequency lists and tips. I'm especially interested in IC-R3 stories and your summertime travel adventures.

Links of interest from this column:

Doug Smith's webpage:

<http://www.w9wi.com>

The Alley Cats, America's Premier Doo-Wop Group:

<http://www.thealleycats.com>

Miami-Dade County Fair and Exposition:

<http://www.fairexpo.com>

Shure Wireless/Microphones:

<http://www.shure.com/wireless/default.asp>

Conklin Shows:

<http://www.conklinshows.com>

National Independent Concessionaires Association, Inc.:

<http://www.nicainc.org>

Biscayne Helicopters:

<http://www.biscaynehelicopters.com/>

Longwave Resources

✓ **Sounds of Longwave** 60-minute Audio Cassette featuring WWVB, Omega, Whistlers, Beacons, European Broadcasters, and more! \$11.95 postpaid

✓ **The BeaconFinder** A 65-page guide listing Frequency, ID and Location for hundreds of LF beacons and utility stations. Covers 0-530 kHz. \$11.95 postpaid

Kevin Carey

P.O. Box 56, W. Bloomfield, NY 14585

Performance Upgrades

Kiwa offers performance upgrades to improve the performance of the following receivers:

AOR AR7030
CC Radio
Icom R71 R75
JRC NRD 525 NRD 535 NRD 301A
Lowe HF150 AP/SP150
Radio Shack DX390/392 DX394 DX398
Sangean ATS909 ATS818
Sony ICF2010
Yaesu FRG7 FRG100

Kiwa Electronics

612 South 14th Ave., Yakima WA 98902

☎ 509-453-5492 or 1-800-398-1146 (orders)

✉ kiwa@wolfenet.com

🌐 www.kiwa.com (full catalog)

Magellan's MAP 330 GPS Receiver — Part II

To be perfectly honest, when I first took on the task of reviewing the Magellan MAP 330, I feared that it might turn out to be a daunting task, that the unit might be extremely difficult to use, and that the whole exercise might turn out to be a pain in the, uh, cheeks.

Fortunately, I am delighted to report that the MAP 330 is extremely easy to use. The User Manual is written so that the whole process of getting up and running is very user friendly. My hat is off to the person who wrote the manual. It's a job well done that never leaves the user wondering what to do next.

After initializing the unit and entering my approximate position, I went outside (where the satellites are visible to the unit) and allowed it to make a position "fix." As soon as the MAP 330 had determined my position on planet Earth, I was able to store that location as a waypoint and to label it: "Home."

Next, my wife and I took a ride. She drove, and I placed the MAP 330 on the dashboard so that the unit could continue to "see" the GPS satellites. The MAP 330 displayed our position, heading and speed. Further, it kept a "bread crumb" trail of our route that it continually updated on the map display.

By selecting any stored waypoint and then accessing another waypoint stored in the MAP 330 (either a waypoint that the user has stored or one that is part of the on-board database of cities), you can instantly find out what the "as the crow flies" distance is between the two points. So, with just a few button pushes, I can instantly find out that it is 8.56 miles from my house to Grafton Lakes State Park. Cool! (Parks, by the way, are part of the database that are built into the MAP 330.)

◆ On top'o the world

Since our family likes to hike and camp, I was particularly interested in the capability of the MAP 330 to load topographic maps from a personal computer onto the GPS unit for display on its screen. The folks at Magellan sent me their MapSend™Topo product, which is a CD of all topographic maps for

the United States derived from the US Geological Survey data plus Woodall's® Campgrounds database, and some other goodies as well. What is very cool about this product is that it contains, in essence, all the USGS maps for the entire US on one CD.

First you install the MapsSend Topo software on your computer. Then you connect the MAP 330 to the computer with the serial cable that is supplied. Then you load the data from the PC onto the MAP 330. This was the only point at which the otherwise excellent user friendliness of the MAP 330 let me down. The instructions say that you must first load "North America MAGUP." This done, I expected the topographic maps to appear on the MAP 330 display, but they didn't.

A call to Magellan's excellent technical support department resolved the problem. To display the topo maps on the GPS unit, you must next select a chunk of real estate from the topo maps to load into the MAP 330. In my case, I

selected a rectangle about 160 miles long by 130 miles wide roughly centered on the Capital Region of New York State and then uploaded it to the MAP 330. Bingo! The next time I turned on the unit, topographic maps were displayed. Further, I could zoom in on the map with 100 foot resolution.

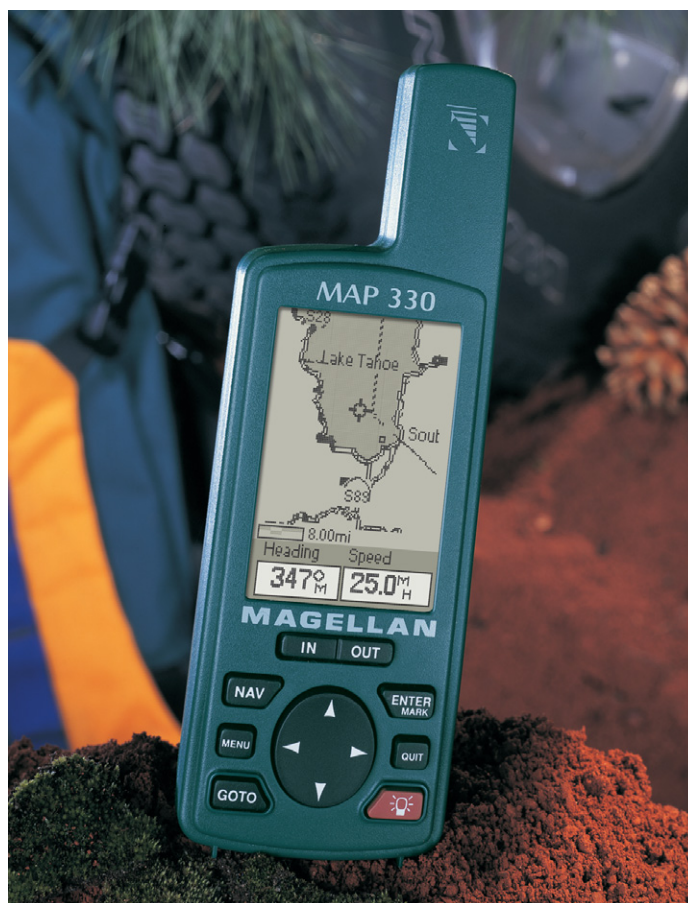
◆ Putting GPS to good use

One of the really terrific features of the MAP 330 with the topo data loaded is the "near to" feature. So, from my house (or any waypoint that I've saved), I can select "campgrounds" and ask that the ones nearest to my position are displayed. In an instant, I find out that Deer Run Campground is just twelve miles away. I press another button and the database on the MAP 330 tells me where it is located, the phone number, the rates, what kind of facilities are available, and so forth. With a few more button pushes, I can see where it is on a map relative to my position. Is this neat, or what? Or, I can search on summits, basins, capes, falls, and a wide number of other features to locate them.

Further, the MAP 330 allows me to create routes with waypoints if I am hiking in the woods and want to be sure I can find my way back. Or, if I find a special spot (a hot fishing hole, buried treasure, what-have-you) and want to be able to get back to it, the MAP 330 lets me mark the spot electronically so I can return again.

And that brings me to a really cool game you can play with a GPS unit. Called "geocaching," it involves using your GPS unit to find "treasures" that other people have cached just so you could find them. Dave Ulmer invented the game, and there are some 40,000 caches hidden around the world. There are a couple of dozen geocaches in my immediate area, and some probably near you. Check out <http://www.geocaching.com> for info about this neat sport, which bears some resemblance to fox-hunting (see this month's feature story) without the competition.

The suggested retail price of the MAP 330 is \$269.99. The MapSend Topo software is \$149.99. I give both my highest personal recommendation.





REVIEW

Radio Shack's Indoor AM Loop Antenna

By Ken Reitz

I challenge you to take \$30 cash to any major league sporting event and see how far it gets you. At best you'll get a seat in the "nose bleed" section, a tepid hot dog and an undersized cold drink heavy on the ice. Of course, you'll have to leave the rest of the family curbside while you splurge.

Instead, I say take the thirty bucks to your local Radio Shack dealer and pick up the Indoor AM Loop Antenna (cat. # 15-1853). With this antenna and just about any decent AM radio you get press box level seats at every major league event within a 500 mile radius and still be just steps away from your fridge or microwave. I can just taste the nachos!

In my opinion, sports is the only reason anyone should be listening to the AM band unless you have a reservation at a nearby asylum with access to long distance privileges. I'm a Baltimore Orioles fan, which is pretty much the same thing, and I've been thwarted by the team's continued indifference to the radio listening fan for years. Local FM stations no longer carry the games and I'm in the skip zone for their flagship station.

◆ What to do?

The solution is to tune in the flagship stations of the opposing teams and listen to the play-by-play. But most AM radios just aren't up to the task. Why can't I use my Kenwood stereo receiver, with its fancy audio outputs and remote control? Well, for starters they issue a cheesy AM loop with the radio which is not worth the landfill space it would take up to bury it. And, you'd be lucky to hear WWL without an antenna on this receiver even if their transmitter was in your back yard.

That's what led me, as I so often am, to The Shack. I was immediately intrigued when I saw the attractive, charcoal gray, indoor AM loop antenna in its well sculpted 9" plastic case. Hmm, I wondered, will this thing actually work? I was buoyed by The Shack's liberal return policy and, forking over the dinero, whisked the loop home.

The loop comes with a 6 foot connecting cable fitted at one end with a micro plug which plugs into the base of the loop and two bare wires on the other end which slip into your radio's external antenna terminals. Don't use the loop on top of a receiver with a

metal case, as it will affect reception. I found the cable to be just long enough to get the loop up and away from the receiver, yet still easily reachable for fine tuning the capacitor on the loop.

If your radio has no external antenna terminals and does not have a metal case, simply set the loop on top of the radio. By setting the loop's tuning knob to the same position as your radio dial you'll hear the signal immediately rise. Rotating the loop will further increase the signal by nulling out stations on the same frequency coming from different directions.

◆ The Results

I had tuned my receiver's AM band, using the aforementioned factory antenna, with dismal results. But, with the RS loop it was a whole new ball game! The night I got the loop the O's were playing the Yanks, so I tuned the receiver to WCBS 880 kHz, the Yankees' flagship station. Slowly adjusting the loop's capacitor knob and rotating the loop, the signal soared to as good as AM is going to get on a spring night. I was able to listen to the whole game with very little fading and with audio which might have rivaled an FM broadcast of the game if one could have been found.

Well, what about other radios? I unplugged the loop and set it without connections on top of the Kloss Model One AM/FM radio and tuned in 880 kHz. Rotating the loop for the strongest signal, I adjusted the capacitor on the front of the loop and *voila!* the bright yellow signal strength LED on the Kloss' front panel lit up like it was a reading lamp. And, thanks to the superb audio of the Kloss radio, I was hard pressed to tell I was listening to an AM station from 500 miles away.

But, what about DX? Can this little loop turn your placid stereo receiver into an AM DX machine? Well, that may be stretching things, but, considering that it's a passive 9" loop it does a pretty decent job. Sure, it brought in the usual Clear Channel war horses and did a fine job bringing in regional regulars. It even pulled in a 500 watt station from over 200 miles away and several 1 kW stations over 500 miles away.

While it's no substitute for a serious DX antenna, the Radio Shack AM loop antenna serves the needs of folks without the room or the money

for big antennas. And, for us sports fans, this little antenna will pay big dividends throughout the year.

SPECS:

Reception: AM Band only (535-1700 kHz)

Output Impedance: 300 Ohms

Dimensions: 9" x 3" x 10" (base)

Weight: 1 pound

For indoor use only.

Antenna Designer

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What's NEW

Tell them you saw it in *Monitoring Times*

New AOR Products

AOR has scheduled a busy summer. Announced for June release is the new Mark II version of the sophisticated AR8600 receiver – the AR8600MKII. The tabletop includes all the same features as the AR8600 but with wider frequency coverage from 100 kHz up to 3 GHz, less cellular. An optional video output module will allow reception of regular TV programming or wireless video cameras with a monitor. Pricing is expected around \$949.95.



A second receiver, the AR-ONE, is also expected in June and boasts a frequency range of 10 kHz-3.3 GHz. However, this radio will not be available to consumers.

AOR also has announced their new LA350 active shortwave loop antenna, the perfect accessory for today's wide-coverage receivers. It comes with interchangeable shortwave loops for 3-9 and 9-30 MHz. Optional longwave and mediumwave bars will soon be available to expand the antenna's coverage. The LA350 is \$299.95.



All these AOR products will be available from Grove Enterprises (800-438-8155; <http://www.grove-ent.com>) Watch for upcoming reviews in *Monitoring Times*.

Jukebox and More

This compact portable MP3 player is no toy! The Neo Jukebox includes a 10 to 40 gigabyte hard drive, Lithium-Ion rechargeable battery (6 hours of play), remote control, earphones, USB cable, AC/DC adaptor, carrying bag, and Musicmatch software for converting your CDs to MP3.



The Neo Jukebox uses a standard laptop hard drive, which means that, in addition to storing 200 to 800 CDs (depending on the drive size), you can also use it to carry any type of file with you – documents, pictures, email, video, etc. – for download to another computer using the high speed USB port.

Access to music is easy with the large LCD screen (128x68 Pixels) and back light. The Neo Jukebox is controlled by nine buttons on front of the player. You can listen via stereo earphones, or play it through your car or home stereo system.

Prices vary from \$219.99 for a 10 Gig hard drive to \$399.99 for 40 Gigs. You can even buy the player without the hard drive and install your own! The Neo Jukebox is compatible with Windows 98/Me/2000 and MAC OS 9.

For more information visit <http://www.ssiamerica.com> or contact Multi Technology Equipment at Multi Technology Equipment, 43C Rocklyn Ave., Lynbrook, NY 11563; 877-901-9709; sales@mteweb.com

Digital FM Transmitter

If you don't want to use a

clunky old cassette adapter to play MP3 audio through your car or home stereo (the younger generation probably doesn't even have a cassette player!), check out C Crane's Digital FM Transmitter. This transmitter lets you send a signal from any audio source to any radio easily, and without wires.



The FM Transmitter is simple to use. Just plug the transmitter into the headphone jack or line out of any audio device and set the frequency of choice (88-108 MHz). You can listen to streaming audio from your computer over your home stereo or listen to portable scanners, etc., in your car or at home without the need for headphones. It has an approximate line-of-

sight range of 70 feet, reduced by walls and metal objects. The FM Transmitter provides full stereo, is drift-free, and features an automatic power off timer. It operates off an included power supply or two AA batteries. The Digital FM Transmitter is \$99.95 from C.Crane, 1001 Main Street, Fortuna, CA 95540-2008; 800-522-8863; email ccraneco@aol.com; <http://www.ccrane.com>

The FM Transmitter provides full stereo, is drift-free, and features an automatic power off timer. It operates off an included power supply or two AA batteries. The Digital FM Transmitter is \$99.95 from C.Crane, 1001 Main Street, Fortuna, CA 95540-2008; 800-522-8863; email ccraneco@aol.com; <http://www.ccrane.com>

DXing Website

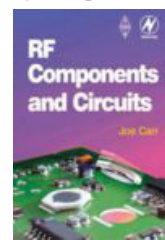
DXing.info is a new information source for radio hobbyists worldwide. Whether you are looking for the latest news on world radio, audio samples, logs, background

articles, DXpedition reports or propagation information, you'll find it on *DXing.info*. The content is aimed mainly at DXers interested in mediumwave and shortwave broadcasting stations, but FM listeners and other radio hobbyists should also find useful material. The reference material – such as a glossary of DX terms with hyperlinks – is useful to the beginner and the veteran hobbyist alike.

To get started, just click on <http://www.dxing.info/> *DXing.info* is edited by Mika Mäkeläinen, a Finnish broadcast journalist and DXer for over 22 years, with contributing DXers from several countries.

RF Components and Circuits

by Joseph J. Carr



Newnes Press says "During his career, the late Joe Carr was one of the world's leading writers on electronics and radio, and an authority on the

design and use of RF systems. Whether you are looking for a complete self-study course in RF technology, or a concise reference text to dip into, this book has the solution."

This book assumes some knowledge of electronics, but the primary emphasis is on understanding how different circuit types work and therefore how they can be modified for different design applications. Sample chapter headings are: Electronic components at RF; Inductance and Inductors; Resonant L-C circuits; RF crystal oscillator circuits; RF frequency synthesizers; Radio antennas; RF mixer circuits; Noise cancellation bridges for receivers, and more, plus several helpful appendices.

RF Components and Circuits, 0-7506-4844-9, is published in paperback, 416 pages, and priced at \$37.99. It is available directly from the publisher at Newnes Press, 225 Wildwood Avenue, Woburn, MA 01801-2041; 781-904-2500; <http://www.bh.com>

What's NEW

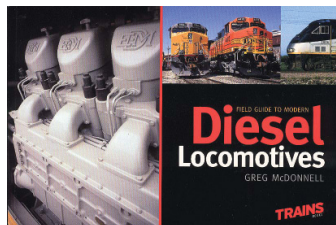
Tell them you saw it in Monitoring Times

While you're visiting Newnes' (Butterworth-Heinemann) website, check out these other new books of interest to radio hobbyists: *Electronics - A First Course* by Owen Bishop (208 pp, paperback, \$29.99); *Electromagnetics Explained - A Handbook for Wireless/RF, EMC, and High-Speed Electronics* by Ron Schmitt (208pp, hardcover, \$34.99); *Fabricating Printed Circuit Boards* by Jon Varteresian (192pp, paperback, \$29.99); *Newnes Data Communications Pocket Book, Fourth Edition* by Steve Winder and Mike Tooley (256pp, hardcover, \$24.99).

Field Guide To Modern Diesel Locomotives

by Greg McDonnell

Many MT readers enjoy listening to railroad communications – the lure of the open road! While the “chug-chug” of the old steam engines has been replaced by the “whirr” of the diesel engine, the railroads are still a vital, dynamic part of the American landscape.



We have reviewed railroad frequency guides in the past, but this new color photo-essay of the diesels provides images and descriptions of what you are hearing on those railroad frequencies.

Some 247 full-color photos documented in 208 pages covers 30 years of General Electric, General Motors, and MotivePower Industries locomotives on the enormous expanse of US railroads.

\$28.95 plus shipping from Kalmbach Publishing Co.; (800) 533-6644.

Catalog for Experimenters

Over 1500 science, laboratory, and weather-related products are

featured in Edmund Scientifics' new 100-page catalog. These include instruments such as the La Crosse wireless weather station, La Crosse radio controlled clock, and the Thunderbolt Storm Detector. If you're looking for science fair items, optics, biomedical instruments, scales, solar equipment, lasers, microscopes, telescopes, etc., write, call or fax for the free Scientifics catalog at Scientifics, Dept A021-C999, 60 Pearce Avenue, Tonawanda, NY 14150-6711; 800-728-6999 or fax 800-828-3299; email cons_order@edsci.com; <http://www.scientificsonline.com>

Indoor TV Antenna Solutions

From the folks who make the familiar the FM Edge and AM Advantage antennas come five new indoor set-top antennas for local television reception.

The TERK TV1 is a replacement for an original factory antenna. The heavy gauge retractable chrome dipoles are an extra-long 40", ensuring greater reception of channels 2-6. TV1 can be used as a primary antenna or as a back up in the event of a cable or satellite outage. The weighted removable base includes a non-slip pad for maximum stability, and allows the antenna to be placed on top of the television set, or plugged directly into the antenna receptacle found on most televisions up to 20". Each TV1 package also includes a UHF loop antenna; Suggested retail is \$9.95.

TV2 is also a high-quality rabbit ear antenna with the convenience of a built-in video selector switch to simplify the hookup of DVD players, video games and other video components without re-connecting any wires or plugs. TV2 includes extra-long 44" retractable dipoles for improved reception of channels 2-6, as well as a UHF antenna that adjusts 360° for maximum reception of all off-air signals. Suggested



retail price is \$19.95.

The TV3 antenna offers a similar design and features as the TV2, with the addition of TERK's unique low-noise amplifier, which boosts weaker signals for maximum reception range and clarity. The amplifier may be by-passed or adjusted to prevent over-modulation of stronger incoming signals. The suggested price is \$39.95.

TV4 features a low-profile design that stands less than 5 inches high, allowing the antenna to fit inside most television cabinets. The tuned receiving elements are able to rotate 360 degrees on top of most televisions without striking walls or other objects, allowing for easier placement and adjustment. MSRP is \$19.95.

The TV5 antenna features a low-profile design similar to the TV4, and adds TERK's low-noise broadband amplifier and built-in video selector switch to its list of features. The low-noise amplifier, similar to that found on the TV3, maximizes reception range and can be bypassed for stronger incoming signals. The built-in video switch

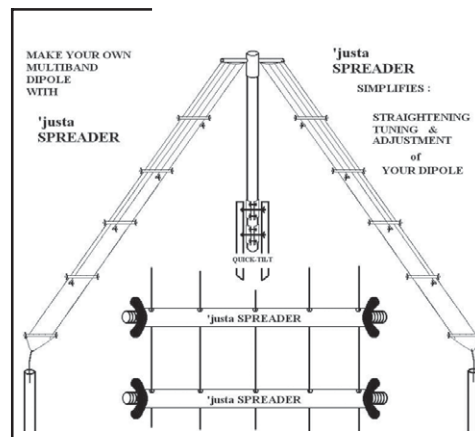


enables the consumer to switch between local programming and their favorite video game or DVD at the touch of a button. All this, and it can still fit inside most TV cabinets. MSRP is \$49.95.

All Terk TV antennas carry a one-year limited warranty. Look for a dealer near you by consulting the finder at <http://www.terk.com> or call 631-543-1900.

An Adjustable Multiband Dipole

Here's a great idea from Gap Antennas. Their new "Justa Spreader" allows you to construct and manage the wires in your multiband dipole. Wingnuts make repositioning easy, and additional split bolts provide a fast, easy way to set individual band resonance for



up to five bands without having to cut your wire. You can move from low to high frequency and back – no soldering iron required.

Look for the Justa Spreader wherever Gap antennas are sold, or contact the manufacturer for a dealer near you. GAP Antenna Products, Inc., 99 North Willow St., Fellsmere, FL 32948, (772) 571-9922, Fax: (772) 571-9988, E-mail: gap@gapantenna.com

Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to mteditor@grove-ent.com.

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"No doubt about it, the future is here! Sure nice to get the magazine so early, this has got to be the way! Thanks for a great job!"

- Charles (Chuck) Boehnke
Keaau, Hawaii

"You and the MT staff that put this project together have done a FANTASTIC job. You would seem to be the leaders in the field presenting material in this manner so it can be archived so easily. This is the way to receive a magazine."

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EDITORIAL STAFF

Correspondence to columnists may be mailed c/o Monitoring Times; any request for a reply should include an SASE.

Frequency Manager	Gayle Van Horn	gayle@webworkz.com
Frequency Monitors	Mark J. Fine	mark.fine@fineware-swl.com
Program Manager	John Figliozi, KC2BPU	jfiglio1@nycap.rr.com
American Bandscan	Doug Smith, W9WI	w9wi@bellsouth.net
Antenna Topics	W. Clem Small, KR6A	clemsmall@hotmail.com
Ask Bob	Bob Grove	bgrove@grove-ent.com
Beginner's Corner	Ken Reitz, KS4ZR	ks4zr@firstva.com
Below 500 kHz	Kevin Carey, WB2QMY	wb2qmy@arrl.net
Bright Ideas	Gary Webbenhurst	ab7ni@arrl.net
Closing Comments	Bob Grove	bgrove@grove-ent.com
Communications	Rachel Baughn	mteditor@grove-ent.com
Computers and Radio	John Catalano	j_catalano@conknet.com
Digital Digest	Stan Scalsky	sscalsk@mail.ameritel.net
.....	Mike Chace	mike@chace-ortiz.org
Easy Access Radio	Jock Elliott KB2GOM	lightkpr@nycap.rr.com
Fed File	Larry Van Horn, N5FPW	larry@grove-ent.com
Letters to the Editor	Rachel Baughn	mteditor@grove-ent.com
Milcom	Larry Van Horn, N5FPW	larry@grove-ent.com
On the Ham Bands	T.J. Arey, N2EI	tjarey@tjarey.com
Outer Limits	George Zeller	georgez@nacs.net
Plane Talk	Jean Baker, KIN9DD	jeanieandbob@earthlink.net
Programming Spotlight	John Figliozi, KC2BPU	jfiglio1@nycap.rr.com
QSL Corner	Gayle Van Horn	gayle@webworkz.com
Radio Restorations	Marc Ellis	mfellis@enteract.com
Satellite Radio Guide	Robert Smathers	roberts@nmia.com
Scanning Canada	John Corby, VA3KOT	johndavidcorby@yahoo.com
Scanning Equipment	Bob Parnass, AJ9S	bob@parnass.org
Scanning Report	Robert Wyman	wymanent@bellsouth.net
SW Broadcasting	Glenn Hauser	wghauser@yahoo.com
SW Broadcast Logs	Gayle Van Horn	gayle@webworkz.com
The Fed Files	Larry Van Horn, N5FPW	larry@grove-ent.com
Tracking the Trunks	Dan Veeneman	dan@signalharbor.com
Utility World	Hugh Stegman, NV6H	utilityworld@ominous-valve.com
View from Above	Lawrence Harris	lawrenceharris@monitoringtimes.com
Washington Whispers	Fred Maia, W5YI	fmaia@texas.net
What's New	Rachel Baughn	mteditor@grove-ent.com

Ads for **Stock Exchange** must be received 45 days prior to publication date. All ads must be paid in advance to *Monitoring Times*.

Ad copy must be typed for legibility.

1-3/4" SQUARE DISPLAY AD: \$50 per issue if camera-ready copy or, \$85 if copy to be typeset. Photo-reduction \$5 additional charge. For more information on commercial ads, contact Beth Leinbach, 828-389-4007.

NOTICE: It is unlawful to buy cellular-capable scanners in the United States made after 1993, or modified for cellular coverage, unless you are an authorized government agency, cellular service provider, or engineering/service company engaged in cellular technology.

STOCK EXCHANGE

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Closing Comments

Our entry into the 21st Century was a giant kick-off from the close of the 20th. Never in the history of civilization have we seen such an acceleration of technical progress.

World War II set the tone, with vast funds and unlimited effort poured into research and developments for defense, culminating with the Manhattan Project's atomic bomb. The spillover from this research founded nuclear medicine, nuclear power, smoke detectors, radioactive tracers, and countless other solutions for technical problems.

In one year alone (1947-1948) we saw the invention of the transistor by Bell Laboratories, the tape cassette by Phillips, and the long playing record as well, all of which have made a consequential impact on civilization. Then those improvements gave way to further improvements, until it has become difficult to imagine that anything really new is yet to be invented, only upgrades of previous inventions. Transistors and their supportive components were combined into integrated circuits (ICs), LPs and tape cassettes deferred to compact diskettes (CDs).

Television has existed since the '30s, but it really flowered in the '50s, going from grainy, washed out monochrome to brilliant, fluorescent color in a few short years.

However, it is the onslaught of computers and the Internet that has had an impact on the world's citizens comparable to the discovery of fire. Distant ports of call are now neighbors; obscure volumes in the Library of Congress are now on everyone's electronic bookshelves.

It has been forecast that hardware telephone lines are already obsolescent; wireless networks are emerging everywhere. The cell phone has been our first experience with untethered, worldwide communications, and now satellites are bringing us instant video and audio access to entertainment, education, business, and personal contact.

By 2015, or so the prognosticators say, nearly 90% of America will be on line, and most of them with wireless, high-speed, high-definition, broadband connections. More than 350 billion dollars' worth of copper wire will be abandoned, relegated to scrap.

Seem hard to believe? Not when we look back to 1986 when only 1 out of 100 homes had a computer or a cell phone!

A Look Forward...

What will shortwave listening be like in another decade or so? Will we still have that hobby? The international broadcasters have been very resistant to the change to single-sideband (SSB) as mandated by the World Administrative Radio Conference of 1992 (WARC '92), with only a few perfunctory experiments having been conducted by a handful of adventurous stations.

However, we note now the appearance of digital modulation schemes and equipment which could make noise-free, high frequency (HF), voice and music broadcasting a distinct and attractive possibility. The likelihood of current AM analog HF systems being obsolete in the next decade or two is a strong possibility.

And now it appears as if a new magic is making an appearance; it's called ultra-wideband (UWB) technology, and it's determined to turn modern wireless communications upside-down. By emitting weak pulses of digital voice or data at levels thousands of times lower than that of a cell phone handset, there appears to be no technical limit to the number of users who can simultaneously share a chunk of spectrum.

Because of its pseudo-random pattern of data transmission,

A Look Back...

by Bob Grove

UWB is immune to eavesdropping, interference, and jamming. Of course it's incompatible with the existing analog and digital communications architecture, so what will happen to the hundreds of billions of dollars' worth of equipment currently on the air if UWB is adopted?

There are some fascinating times ahead, and *MT* will be there as your tour guide. After all, we've been your leading source of radio information for more than two decades, and we aren't stopping now!

And a Double-take.

All of this information gathering wouldn't be possible without a skilled, informed team of writers. And at the helm of this professional group is the editor, whose responsibilities are daunting.

It's hard to believe that this issue celebrates the 20th anniversary of Rachel Baughn's employment with Grove Enterprises and *Monitoring Times*. Rachel has done, and will continue to do, an outstanding job of sorting the material, choosing graphics, editing the submissions, appointing the writers, providing a forum for intercommunication, answering reader queries, and all the other day-to-day responsibilities that face an editor of a magazine as widely read and respected as *MT*.

I asked Rachel for some of her recollections: What's it been like to be responsible for the total contents of hundreds of issues of *MT*?

"I started working for Grove Enterprises just as the business moved out of Bob and Judy's home into a new building. Actually, my job then was to answer the telephone, write up orders, and balance the books. Though I have little aptitude for numbers, I did enjoy what I was learning about radio. So, when Grove obtained their first computers and decided to publish *Monitoring Times* themselves, I immediately volunteered. I entered the articles into the computer from typed or handwritten copy, printed it out in column-width text, trimmed it down with a paper cutter, waxed the back of it, and pasted it by hand onto the newspaper-sized layout sheets, ready for print.

"That's more or less what I did for the next nine years, but a lot changed in how I did it. During this time we moved to magazine format, did all the layout on the computer instead manually, and changed editors. Following the merge with Larry Miller's shortwave publication, he became editor off-site from his home in Pennsylvania. That meant I was the only person to see the magazine as a whole. I guess that's when I started to acquire some editorial skills myself.

"I became managing editor in July 1991. It has been a rewarding experience, but I certainly couldn't have done it without the groundwork already laid by Bob Grove and Larry Miller, and without the continuing support of Larry Van Horn, my assistant editor, and the dedicated writing staff.

"In the past 20 years probably the most significant change has been technology – especially the evolution of email and the internet. It has totally changed the way I do my job. Today we can put out a better and more attractive product in much less time, and that's very gratifying.

"Do 20 years of monthly deadlines get old? Not really; they are like guide lines that keep me focused and provide a rhythm to life. And when the inevitable crises occur I've learned to count on serendipity to bail us out, coming up with a cover when we had none, or making it look like a themed issue when several authors all write about the same topic. Life with *MT* is never boring!"

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The Grundig Satellit 800 Millennium is able to receive faraway signals from London, Moscow, Rome, Beijing, Baghdad... and Paris. It brings shortwave signals home like no other portable radio - with exceptional sensitivity and selectivity... with powerful features like synchronous detection to reduce fading-signal distortion... and automatic gain control (AGC) to keep the volume at a constant level. The Satellit 800 Millennium is microprocessor controlled (naturally). Adjusting volume. Optimizing reception.

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